



Information Circular 89-1

NEW BRUNSWICK'S MINERAL INDUSTRY 1988

Edited by
Barbara M.W. Carroll

Minerals and Energy Division
Department of Natural Resources and Energy
Province of New Brunswick

1989

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Department of Natural Resources
and Energy
Fredericton, New Brunswick

To all user groups:

It is my pleasure to present "New Brunswick's Mineral Industry, 1988," twelfth in a series of reports prepared by the Minerals and Energy Division for use by the mining community.

The mining industry's importance to New Brunswick's economy has grown dramatically in recent years, and the Department of Natural Resources and Energy intends to foster further economic growth and development. Our goal is to obtain full economic benefit from our abundant mineral resources. To accomplish this, we will continue to encourage prospecting, exploration, mining activity, and mineral processing in the Province while maintaining the integrity of the environment.

Yours sincerely,

A handwritten signature in dark ink, appearing to read "Morris Green". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

MORRIS GREEN
Minister of Natural Resources and Energy



Department of Natural Resources
and Energy
Fredericton, New Brunswick

The Honourable Morris Green
Minister of Natural Resources and Energy
Fredericton, New Brunswick

Sir:

I am pleased to submit for your approval "New Brunswick's Mineral Industry, 1988," a report of mining activities compiled by the staff of the Minerals and Energy Division.

This publication includes information which is not contained in the Department's regular series of reports. It is a historical record of exploration, development, mining, and government activities which have taken place within New Brunswick during 1988.

Yours sincerely,

BRYAN J. WALKER
Deputy Minister

ACKNOWLEDGEMENTS

The staff members of the Minerals and Energy Division who have contributed sections to this report are:

1	E.T. Owens	13	J.J. Thibault
2	S.L. DeVenney	14	T.C. Webb
3	Dr. J.L. Davies	15	P.C. O'Leary
4	S.R. McCutcheon	16	R.D. Harris
5	Dr. A.A. Ruitenberg	17	S.K. McEwan
6	L.R. Fyffe	18	R. Butler
7	A.G. Pronk	19	E.V. Jackson
8	A.A. Seaman	20	W.R. Carr
9	G. Crouse	21	B.M.W. Carroll
10	R.R. Irrinki	22	C. St. Peter
11	D.J.J. Carroll	23	R. Phillips
12	G.J. Greer	24	R.D. Shaw

Karen Gallagher and Freda Kelly contributed to the typing of this report and Terry Leonard drafted maps and graphs. The photographs were obtained from staff and the Division's collection.

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CHAPTER 1. GOVERNMENT ORGANIZATION AND PROGRAMMES

MINERALS AND ENERGY DIVISION¹

Assistant Deputy Minister: W.F. Denny
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-3862

The management of the mineral resources of New Brunswick is embodied in the legislation which governs the exploration, development, production, and refining of the metallic, nonmetallic, and structural materials of the Province. The administration of the Acts and regulations includes direct liaison with companies in the mining industry, who are the principal clients, and involves monitoring such activities as prospecting, ore extraction, processing, and mine reclamation.

In addition to the direct mining responsibility, the Division directs the management of indigenous resources for energy conversion and is responsible for activities associated with all forms of conversion other than electricity generation and distribution.

The details of the organization of the Division (Figures 1a, 1b, 1c, 1d) and the functions of each branch are explained in the following pages.

Staff Support (Administration and Secretarial)²

Administrative Services Officer: Sandra L. DeVenney
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

Support staff of the Minerals and Energy Division report to the Assistant Deputy Minister. Staff support in 1988 was provided by: Sandra DeVenney (Administrative Services Officer), Linda Ward (Secretary III), Diane Blair (Secretary III), Shelly Stephens (Secretary II), Carol Grant (Secretary II), Barb MacGougan (Secretary I), Peggy Jones (Secretary III), Sherry Munn (Secretary I, MDA), Laura-Lee Williams (Secretary I, Energy Agreement).

Provincial and federal/provincial agreement budgets of Minerals and Energy Division are summarized below and in Figure 2.

PROVINCIAL BUDGET FOR MINERALS AND ENERGY DIVISION (fiscal year 1988-89)

Mineral Development Branch	\$ 444 100.
Geological Surveys Branch	1 574 200.
Energy Branch	732 900.
Administration	<u>334 900.</u>
	\$3 086 100.

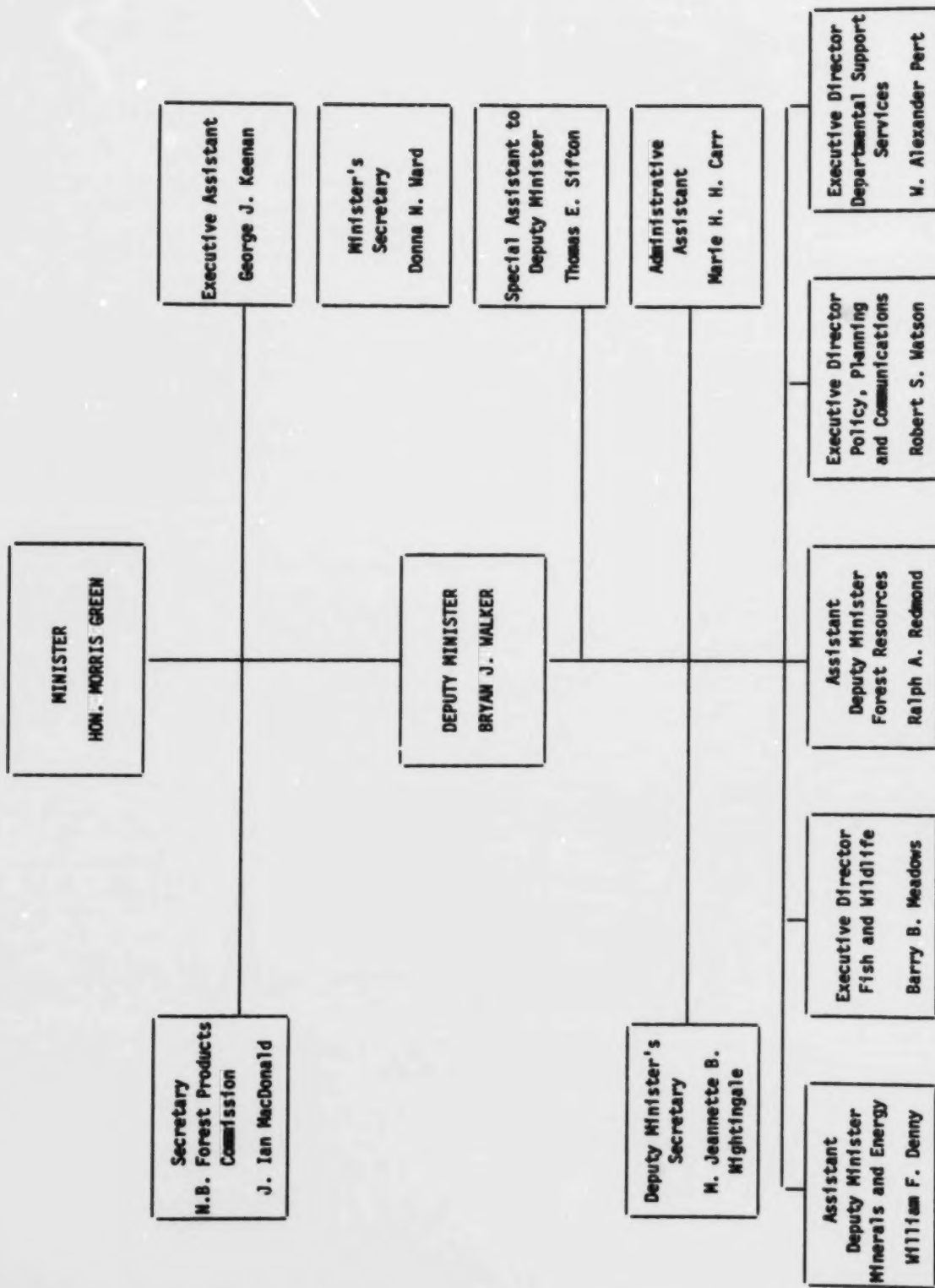


Figure 1a. Plan of organization, New Brunswick Department of Natural Resources and Energy.

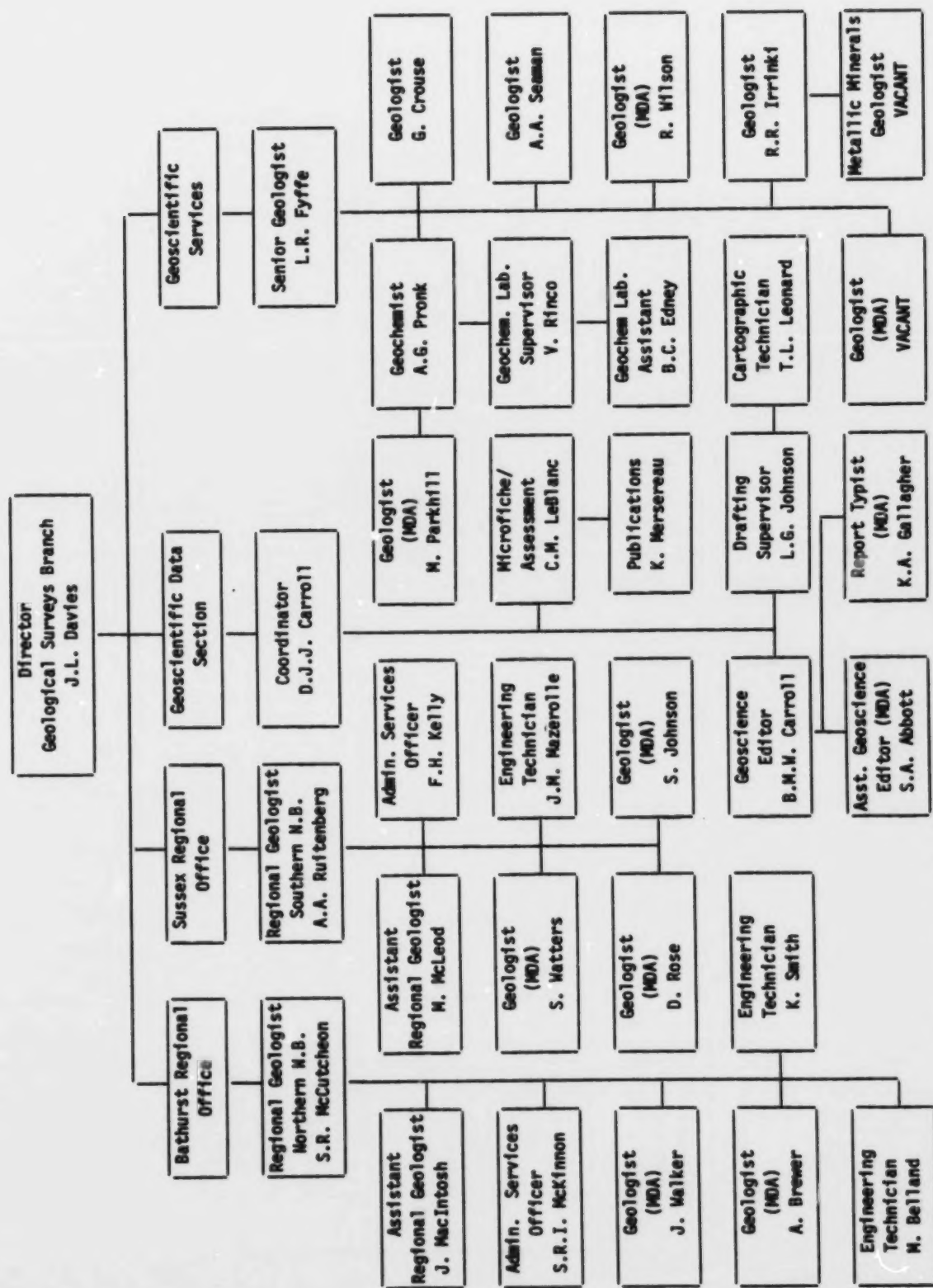


Figure 1b. Plan of organization, Geological Surveys Branch.

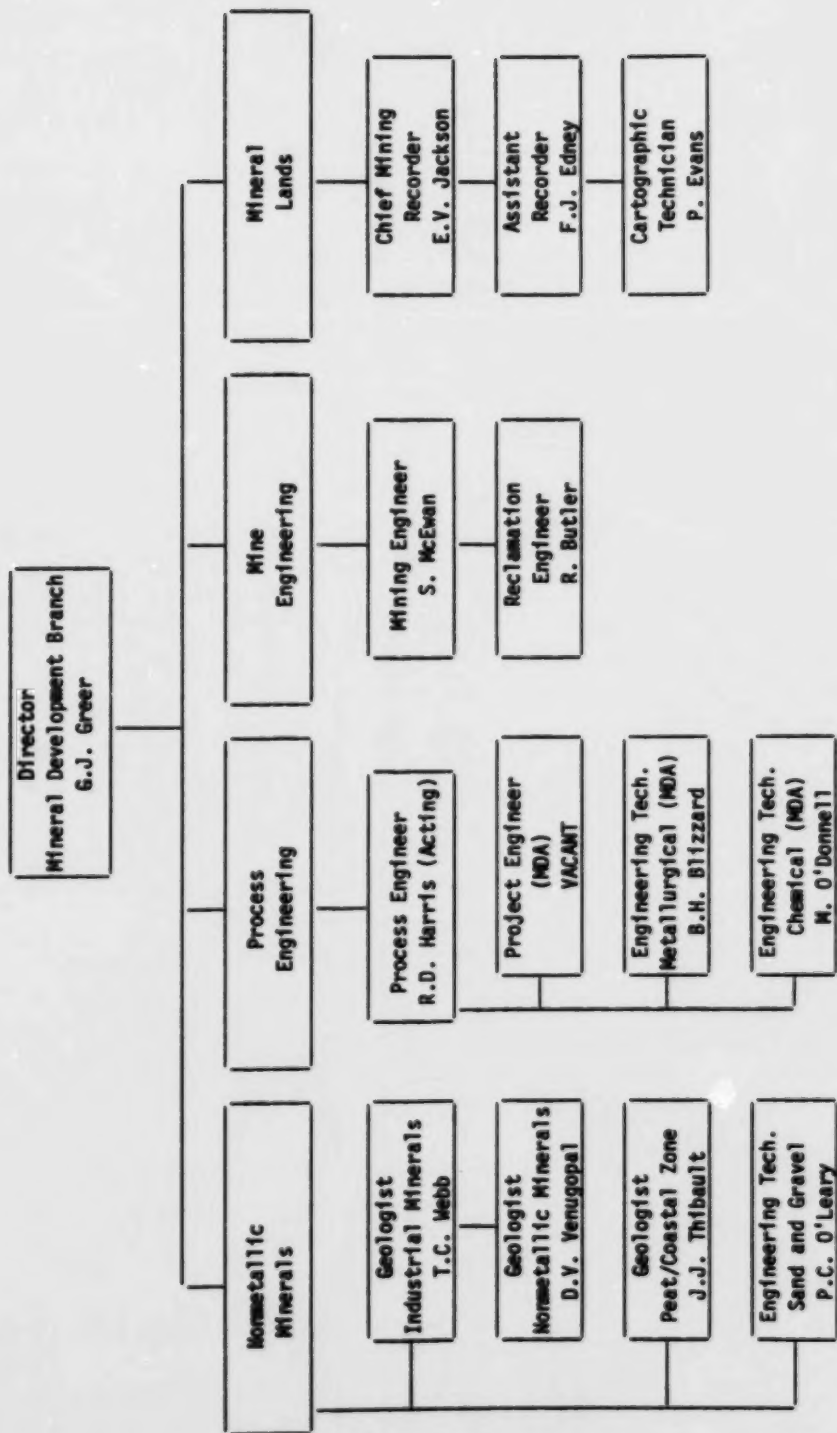


Figure 1c. Plan of organization, Mineral Development Branch.

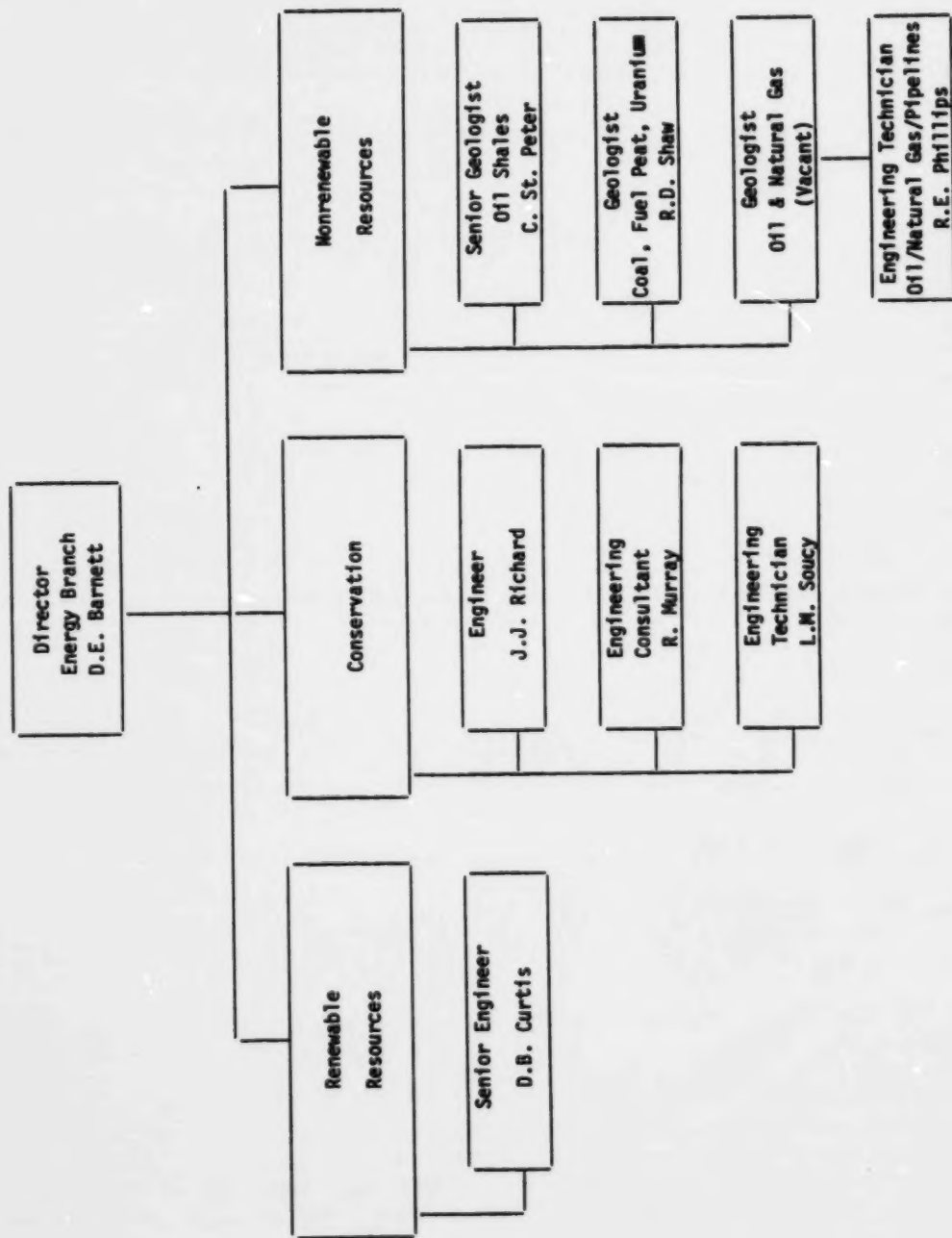


Figure 1d. Plan of organization, Energy Branch.

FEDERAL/PROVINCIAL AGREEMENT BUDGETS
(fiscal year 1988-89)

Agreement	Budget	Expenditures
Mineral Development	\$3 624 600	\$2 319 614.88
Energy	<u>421 400</u>	<u>372 952.91</u>
	\$4 046 000	\$2 692 567.79

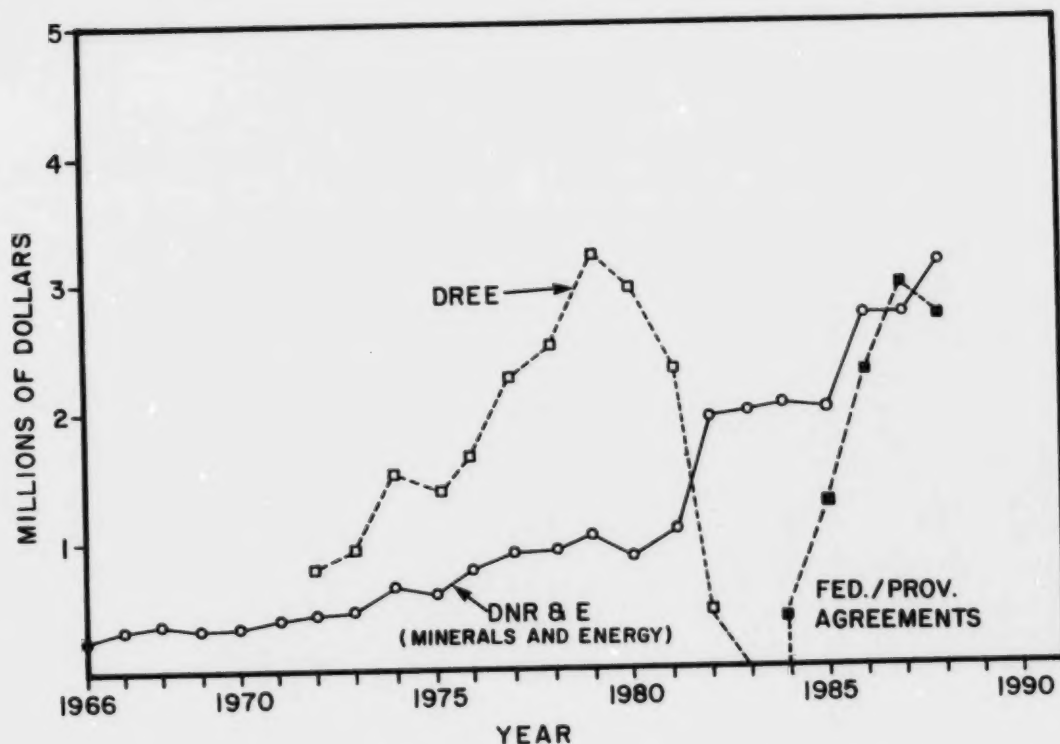


Figure 2. Budget of Minerals and Energy Division, 1966-1988. The federal/provincial agreements included Mineral Development and Energy agreements in 1988.

GEOLOGICAL SURVEYS BRANCH³

Director: Dr. J.L. Davies
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

The Geological Surveys Branch is responsible for the collection and dissemination of information pertaining to the geology and mineral deposits of New Brunswick. Closely associated activities include the encouragement of mineral exploration, the promotion of the mining industry, and assistance to those who formulate resource and land use policies. Although the activities of the Branch since its formation have been aimed at helping the mineral industry, there is an increasing awareness and use of geological knowledge in land use planning, environmental evaluations, engineering

projects, and groundwater studies. The principal objective of the Branch is to provide a complete and up-to-date inventory of geological data to stimulate and guide mineral exploration, and to encourage sound resource planning.

Numerous field projects carried out in 1988 and reported in this publication are supported by the Provincial "A" budget and the Canada - New Brunswick Mineral Development Agreement (MDA) budget. In fiscal year 1988/89, the "A" budget of the Branch was substantially increased from approximately \$1 300 000 to \$1 700 000. The increase entailed the creation of three new professional positions and a \$150 000 Mineral Exploration Stimulation Programme (MESP). The MDA budget, amounting to approximately \$805 000, is part of the total of \$22 300 000 allotted for the period 1984-89. Projects comprise bedrock and regolith mapping, mineral deposit studies, collection of diamond-drill core, geochemical stream-silt surveys, and preparation of public displays.

Bathurst Regional Office⁴

Regional Geologist: Steven R. McCutcheon
Address: P.O. Box 50, Bathurst, N.B. E2A 3Z1
Telephone: 547-2070

Staff of the Bathurst Regional Office in 1988 consisted of: Steven R. McCutcheon (Regional Geologist), James A. MacIntosh (Assistant Regional Geologist), Sharon McKinnon (Administrative Services Officer), Kevin Smith, and Maurice Belland (Engineering Technicians).

In 1988, Kevin Smith took over the duties previously carried out by A. LeBlanc who accepted employment with Caribou New Brunswick Mining Limited.

D.M. Burton and G.R. Philpott, contract geologists responsible for projects funded through the Canada - New Brunswick Mineral Development Agreement (MDA), have both left the Department and taken positions with NovaGold Resources and the American Academy of Dramatic Arts, respectively. J. Walker and A. Brewer will finalize their projects. M.A. Parkhill, an MDA contract geologist who works for T. Pronk in Fredericton, also works out of the Bathurst Office.

CANADA - NEW BRUNSWICK MDA PROJECTS D. Baird and J. Walker finished the mapping and lithogeochemical sampling programme in the Upsalquitch Forks map area, NTS 21 0/10 (Figure 3). Nine of the twenty-five 1:10 000 maps were completed; the other sixteen were completed in 1987 by J. Creamer and B. Murphy. B. Murphy, under the supervision of S. Barr at Acadia University, is working on an MSc thesis on the mafic intrusive and volcanic rocks in the area. He has collected additional samples for whole-rock geochemistry. The Upsalquitch Forks project was undertaken to locate favourable alteration zones, test them for their gold potential, and ascertain their geological setting.

G.R. Philpott prepared 1:20 000 scale geology maps of the Charlo River area, parts of 21 0/15 and 21 0/16 (Figure 3), and did a petrographic

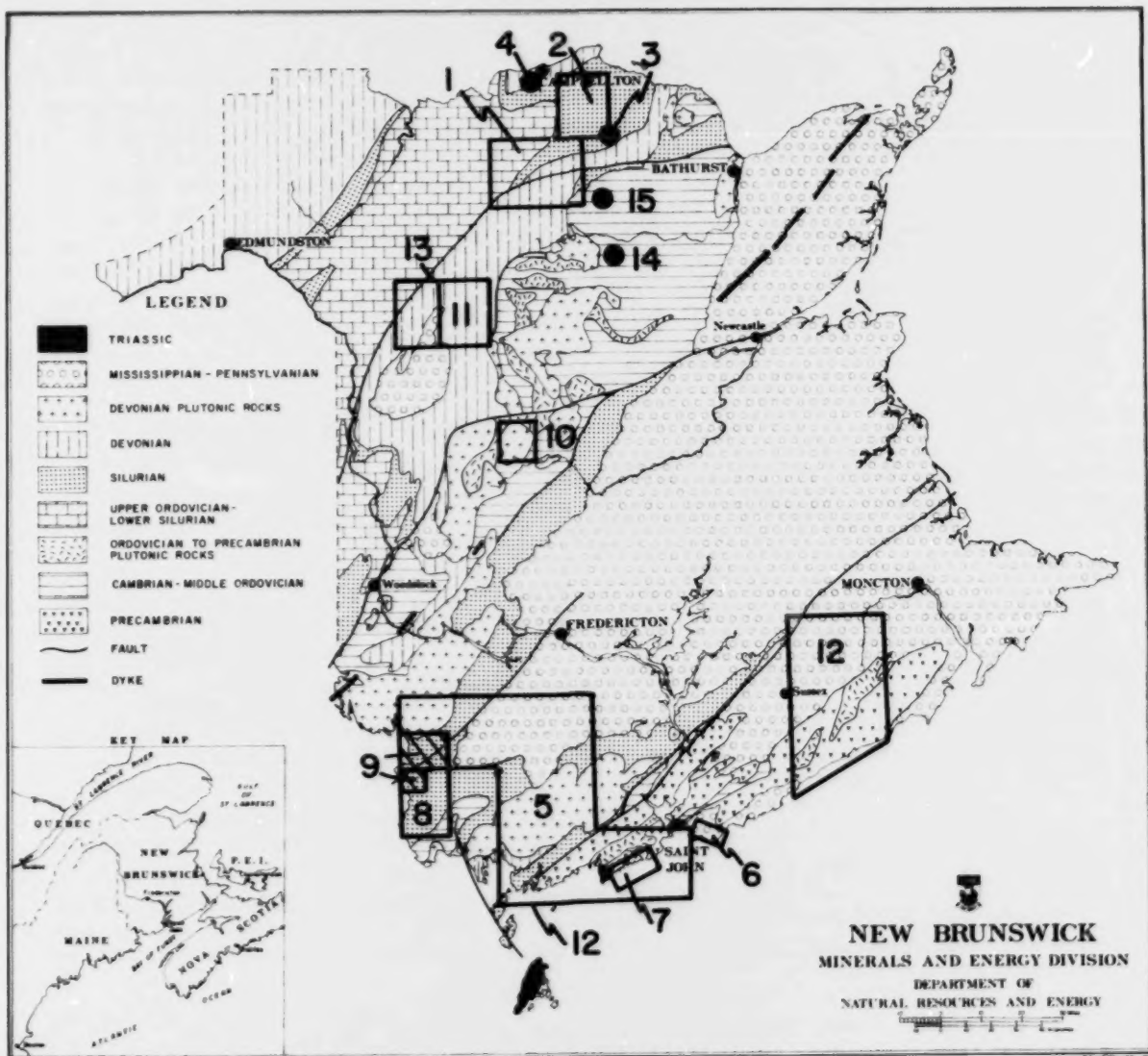


Figure 3. Areas in which Geological Surveys Branch projects were conducted in 1988: (1) mapping and lithogeochemical sampling, Upsalquitch Forks; (2) mapping, Charlo area; (3) core relogging, Rocky Brook; (4) mapping, Sugarloaf Prov. Park; (5) mapping, Saint George Batholith; (6) mapping, Cape Spencer-Black River area; (7) mapping, Dipper Harbour to Musquash Harbour; (8) mapping and geochemical sampling Rollingdam West; (9) mapping, McAdam-St. Croix River area; (10) mineral potential, Burnthill Brook area; (11) mapping, Riley Brook area; (12) Quaternary studies; (13) surficial mapping and till sampling, Riley Brook area; (14) Halfmile Lake study; (15) Murray Brook study.

and geochemical study of the intrusive rocks present. Samples from the Popelogan porphyry-copper skarn were submitted for analysis in order to test the skarn's gold potential. The final report on the project is being prepared by A. Brewer.

The 1:10 000 scale geoscience compilation maps for NTS 21 0/8 are complete except for the geology layer. Compilation of the geology is in progress.

The Heath Steele project, directed by P.F. Williams and A.L. McAllister, was in its final year.

C. van Staal and his crew continued structural-stratigraphic studies in the northern Miramichi and Elmtree terranes. They used the Bathurst office as their field base, utilizing some of its space and facilities.

PROVINCIAL PROJECTS S.R. McCutcheon, D. Baird, and J. Walker relogged core from several of the holes drilled on Lacana's (now Corona Corporation) Rocky Brook property in the Silurian-Devonian volcanic belt, NTS 21 0/9 (Figure 3). The stratigraphic section is cut by a number of northerly dipping dykes of intermediate to felsic composition. Some dykes, particularly the felsic ones, are associated with brecciated, silicified, and mineralized fracture zones. An associated gravity anomaly suggests that these dykes and fractures may be coeval with a large intrusive body at depth.

S.R. McCutcheon and M.J. Belland sampled a suite of rocks at the Brunswick No. 6 open pit to determine if anomalous arsenic, antimony, mercury $\pm$ tin $\pm$ bismuth $\pm$ gold are related to late, cross-cutting structures and if the quartz-porphyrific felsic tuffs that are associated with the "ore horizon" are actually epiclastic rocks.

Jim MacIntosh began geological mapping of Sugarloaf Provincial Park (Figure 3). The purpose of the project is: (1) to produce a layman's report on the geologic features of the park for distribution to tourists, and (2) to determine if the gold-in-till anomaly within the park is explained by the local geology.

R.R. Irrinki (Fredericton office) and S. Creamer have been working on the Halfmile Lake sulphide deposit (Figure 3). S. Creamer relogged and sampled many drill cores and all the information was entered into a computerized file (see page 17).

DIAMOND-DRILL CORE In 1988, Acadia Mineral Ventures Limited turned in more than 6000 m of core from various properties in the Millstream area, and about 3000 m of core was salvaged from the Popelogan deposit. Outside storage racks are being built at Madran that will accommodate about 100 000 m of core when completed. About this much core is on the ground now (see page 16).

OTHER ACTIVITIES An electron-microprobe study was completed by L. Lewczuk, New Brunswick Research and Productivity Council, on three gold-bearing samples from the Millstream area. The gold occurs as electrum

(10-30% Ag) within pyrite and arsenopyrite, or at pyrite-arsenopyrite grain boundaries. The average electrum grain size is about 10 microns. Ankerite and Fe-rich chlorite are spatially associated with the gold. One sample contains adularia, a mineral that is associated with the "precious-metal horizon" in classic epithermal deposits.

Whole-rock chemical analyses were done on two massive sulphide samples collected adjacent to a felsic dyke in the Brunswick No. 12 mine. Besides base metals, the rocks also contain up to 1700 ppb Au, 1000 ppm Sb, 300 ppm Sn, 20 ppm In, 440 ppm Cd, 1100 ppm Ag, and greater than 1000 ppb Hg.

The data release on October 24th, 1988, shows the importance of airborne gradiometer data in delineating major geologic structures. The total magnetic field and vertical gradient maps for the Nepisiguit Lakes map sheet (NTS 21 O/7) show an elliptical structure that is centred upon the headwaters of the Tobique and Nepisiguit rivers. This structure, which measures 5 by 8 km, is also marked by a gravity anomaly and a topographic low. This evidence, together with the rock-unit distribution on the 1:250 000 geology map of New Brunswick (NR-3), indicates that this structure is an Early Devonian caldera complex. Abundant sedimentary rocks in its interior suggest that this caldera, the Mount Sagamook complex, is less deeply eroded than the Mount Pleasant caldera complex, and therefore has potential for intracaldera- and ring-fracture-type deposits.

A field guidebook was prepared for "Gold Symposium New Brunswick 1988" that was held in Saint John in June. The same guide was used for the CIM District I field trip in September.

A portable radio-navigation unit, a LORAN CAPRI SCOUT, was tested for its accuracy in locating mineral occurrences. Precise locations are required for the New Brunswick mineral occurrence computer file. Unfortunately, this unit did not provide the required accuracy, but it is hoped that a satellite-based portable unit will prove acceptable.

D.M. Burton presented poster displays at the Annual Meeting and Convention of the Prospectors and Developers Association in Toronto, the Atlantic Geoscience Society (AGS) meeting in Antigonish, Nova Scotia, and the Geological Association of Canada (GAC/MAC) meeting in St. John's, Newfoundland, and gave a talk at "Gold Symposium New Brunswick 1988" in Saint John on the precious-metal potential of the Silurian-Devonian volcanic rocks in the Jacquet River belt. G.R. Philpott gave a talk at the Canadian Institute of Mining & Metallurgy District I Meeting in Fredericton on the precious-metal potential of the Charlo River area. S.R. McCutcheon gave talks based on his thesis research on the Mount Pleasant caldera complex at the AGS and GAC/MAC meetings. He also gave a talk on epithermal mineralization at the District I meeting and participated in the Geological Society of America's Penrose Conference on Marine Evaporites that was held in Windsor, Ontario.

S. McKinnon and K. Smith provided efficient service with regard to claim staking and recording. M. Belland monitored forestry operations for potential conflicts with mineral exploration.

Sussex Regional Office⁵

Regional Geologist: Dr. Arie A. Ruitenberg
Address: P.O. Box 1519, Sussex, N.B. E0E 1P0
Telephone: 432-2010

The staff of the Sussex Regional Office in 1988 consisted of Arie A. Ruitenberg, Regional Geologist; Malcolm J. McLeod, Assistant Regional Geologist; Maurice R. Mazerolle, Engineering Technician, and Freda H. Kelly, Administrative Services Officer. Sheila E. Watters, David G. Rose and Susan C. Johnson were employed on long term contracts associated with the Canada - New Brunswick Mineral Development Agreement. Paul G. Chiswell and Angela Roy were employed during the summer and fall season.

PROGRAMMES AND PROJECTS M. J. McLeod completed the detailed study of the Saint George Batholith (Figure 3) and its potential for tin and tungsten deposits. The study included detailed mapping (compiled at a scale of 1:20 000), geochemical sampling, petrographic analysis, and geochronology of the various intrusive phases that were mapped. Based on this information, a detailed assessment of the economic potential of the Batholith has been completed. The Batholith comprises three suites, each of which exhibits unique metallogenic signatures. The Late Silurian suite has no significant potential for metallic mineral deposits, but it contains some high-quality building and monumental stone. Potentially economic gold deposits are associated with the Early Devonian suite. The Late Devonian suite has high potential for economic tin and possibly other related mineral deposits. Areas of highest potential are delineated and described in the final report on this project.

S.E. Watters continued a study of gold deposits and occurrences in the Cape Spencer - Black River area, southeast of Saint John (Figure 3). In 1988, detailed (1:10 000 scale) mapping was completed. Emphasis was on structural control of the ore zones and petrography and geochemistry of rock alteration associated with the ores. The ores are hosted by mylonitized Precambrian granitoids and by Carboniferous or older sedimentary rocks of the Cape Spencer Formation. Gold occurs as microscopic grains both in quartz-ankerite-sulphide veins and in illitized, pyritiferous host rock adjacent to veins. The veins and illite alteration are controlled by Hercynian thrust faulting, which locally emplaced Precambrian granitoid rocks over sedimentary rocks of the Cape Spencer Formation.

A.A. Ruitenberg and M.J. McLeod remapped some of the gold-bearing structures in the Dipper Harbour, Little Dipper Harbour, and Musquash Harbour areas, southwest of Saint John (Figure 3). The main gold-bearing veins and stockworks in this area are associated with thrust fault zones similar to those of the Cape Spencer - Black River area, southeast of Saint John.

D.G. Rose and S.C. Johnson completed the mineral occurrence computer file for the Province. A programme to extract information from the file in a report format was developed, and thorough editing of the data base was begun. Several occurrences were examined in the field and a LORAN CAPRI SCOUT navigation instrument was tested to determine its usefulness in

measuring latitudes and longitudes of occurrences. The file and its accompanying location plots provide basic data for mineral exploration and metallogenic studies.

A surficial geologic mapping and geochemical sampling programme was conducted by P.G. Chiswell in the area covered by the western half of the Rollingdam map sheet, 21 G/6 (Figure 3). The eastern half of the map sheet was completed in 1987. The Rollingdam area covers the Honeydale Thrust along which Ordovician graphitic slate, siltstone, and sandstone are superimposed on Silurian turbidites. Several prominent gold anomalies were detected. The lithologic compositions of the tills and glacial structures delineated on the maps facilitate relating anomalies to their bedrock source. These maps can also be used to assist in productivity-oriented forest site classification.

A.A. Ruitenbergh in co-operation with S.C. Johnson and L.R. Fyffe completed a reconnaissance field investigation and synthesis of gold deposits and occurrences in the Province. The deposits were described and classified and the relationship to the tectonic evolution of New Brunswick was demonstrated. Epigenetic auriferous deposits included quartz-carbonate veins and stockworks, polymetallic veins, contact metasomatic, porphyry copper, and volcanic breccia (epithermal) deposits. Many of these deposits are concentrated in dilatant structures within thrust and wrench fault zones that define the boundary zones of tectonostratigraphic terranes. The report was submitted for publication to the Canadian Institute of Mining and Metallurgy Bulletin.

A.A. Ruitenbergh, S.E. Watters, and M.J. McLeod prepared a field-guide to gold deposits of the Fundy Coastal Zone and Saint George Batholith areas for "Gold Symposium New Brunswick 1988" in Saint John. The entire staff of the Sussex Regional Office was involved in the organization of the gold symposium, which was attended by about 100 geologists and prospectors from across Canada and the United States (Figure 4). S.E. Watters and A.A. Ruitenbergh prepared papers for the symposium.

Consultations were provided for many geologists, prospectors, and engineers during the year. The main interest continued to be gold deposits and platinum-group elements. With improved market conditions, a revival of tin exploration is expected.

Geological advice related to forest site classification was provided to foresters employed by government and the forest industry. Regolith maps of the Rollingdam area provide essential information on nutrient potential, internal drainage, and general ground conditions. Well-drained soils on tills composed predominantly of material derived from the Ordovician Cookson Formation and the Silurian Flume Ridge Formation are more fertile than those developed on tills composed mostly of Waveig Formation material. The most productive soils in the area have formed on tills composed predominantly of mafic and ultra-mafic intrusive rocks.



Figure 4. (L to R) Dr. Virginia Gillerman (keynote speaker), Roy McIntyre (prospector), and Les Fyffe (Geological Surveys Branch geologist) at the poster display of "Gold Symposium New Brunswick 1988" held in Saint John.

Geoscientific Services Section⁶

Senior Geologist: Leslie R. Fyffe

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The Geoscientific Services staff, located at the Hugh John Flemming Forestry Centre in Fredericton, consists of Leslie R. Fyffe (Senior Geologist), Rao Irrinki (Metallic Minerals Geologist), Gregory W. Crouse (Core Librarian), Allan A. Seaman (Quaternary Geologist), A.G.(Toon) Pronk (Geochemist), Valeria Rinco (Geochemical Analyst), and Bettina Edney (Laboratory Assistant).

In addition to the regular staff activities, several projects were carried out by contract and summer personnel under the Canada - New Brunswick Mineral Development Agreement. In the Riley Brook map area (NTS 21 0/3), A.G. Pronk and M.A. Parkhill mapped the surficial geology and collected till samples for geochemical analysis, and R.A. Wilson and R.M. Sullivan mapped the bedrock. H.E. MacLellan compiled the field and lithogeochemical data on the tin-bearing granites of the Burnthill Brook area (NTS 21 J/10). A.A. Seaman examined the Quaternary stratigraphy of southern New Brunswick. L.R. Fyffe commenced mapping along the southwestern contact of the Pokiok

Batholith (parts of NTS 21 G/6 and 21 G/11). In addition, D. Kim compiled a computerized geological bibliography of New Brunswick using dBase III+.

GEOLOGY A study of the bedrock geology of the McAdam-St. Croix River area (Figure 5) was carried out with funding from the Canada - New Brunswick Mineral Development Agreement. The area is located approximately 135 km southwest of Fredericton along the border between Maine and New Brunswick (Figure 3). The geology was completed for three 1:20 000 scale maps (NTS 21 G/11c, d, and 21 G/6e).

Detailed geologic mapping of the tin-tungsten-bearing granites in the Burnthill Brook area (NTS 21 J/10 and part of 21 J/15) was completed in 1986 by H.E. MacLellan. This mapping has established that four rock units, based on differences in texture and mineralogy, are sufficient to characterize the main variations throughout the granite plutons. Argon-argon dating has confirmed field evidence indicating that these plutons were the latest in a series of intrusive events that began in the late Silurian.

Several altered and mineralized samples were selected in 1987 for geochemical analysis in order to evaluate the metallic mineral potential of the Burnthill Brook area (Figure 3). The samples represent variously greisenized, feldspathized, and brecciated rock-types within the Middle Devonian plutons as well as quartz veins and silicified stockworks from the plutons and their surrounding country rocks. These analytical results were published in Geoscience Report 88-1.

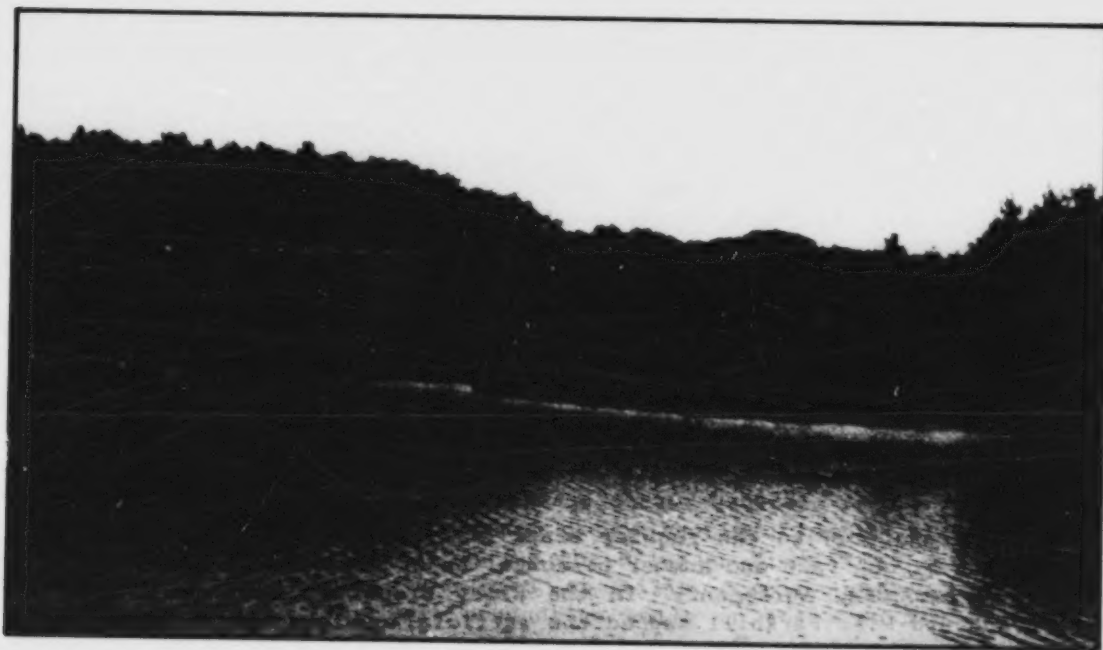


Figure 5. Outcrop of the Flume Ridge Formation at the Grand Falls Dam on the St. Croix River.

Detailed geological mapping of the Riley Brook (east) sheet (NTS 21 O/3E) by R.A. Wilson began in the summer of 1988 (Figure 3). Preliminary mapping indicated an intimately interbedded succession of felsic, mafic, and lesser intermediate tuffs and flows and sedimentary rocks.

GEOCHEMISTRY LABORATORY⁷ The laboratory is staffed by: A.G. (Toon) Pronk, Geochemist; Mrs. Valeria Rinco, Chemical Analyst; and Mrs. Bettina Edney, Laboratory Assistant.

Prior to its relocation to new facilities in the Hugh John Flemming Forestry Centre, the role of the geochemistry laboratory was reviewed by the Division. Suggestions were solicited from C.F. Gleeson and Associates Ltd. In October, the Division hired a professional geochemist, A.G. Pronk, to oversee the operation of the laboratory and field surveys.

The geochemistry laboratory is equipped to analyse Cu, Pb, Zn, Ag, Ni, Co, Fe, and Mn by atomic absorption spectrometry and Sb, W, V, and Mo by various colorimetric methods.

Toon Pronk presented papers on "Till geochemistry and gold exploration in northern New Brunswick" to the Association canadienne-française pour l'avancement des sciences (ACFAS) in Moncton and at "Gold Symposium New Brunswick 1988" in Saint John. "Applied Quaternary geology" talks were given at the University of New Brunswick at Fredericton, at the University of Quebec at Montreal, P.Q., and at the Free University of Amsterdam, Amsterdam, The Netherlands. A paper entitled "Quaternary geology of northern New Brunswick in a regional context" was presented at the VI Association québécoise pour l'étude du Quaternaire (AQQUA) Congress, Rimouski, P.Q. "Quaternary geology, till geochemistry, and gold exploration in northern New Brunswick" was presented at the Eighth International Symposium on Prospecting in Areas of Glaciated Terrain (PAGT'88), Halifax, Nova Scotia.

QUATERNARY GEOLOGY^{7,8} A multi-year project commenced in 1988 to examine the glacial deposits and ice-flow indicators of southern New Brunswick (1:250 000 scale map sheets 21 G and 21 H). The objectives of this project are to determine the chronological relationships between the differing ice-flow events; the till sheet, if any, associated with each event; and the physical and chemical characteristics of each individual till sheet.

Field work in 1988 was concentrated in two areas: (1) a corridor across the Caledonian Highlands and onto the New Brunswick lowlands, primarily NTS map areas 21 H/6, H/11, and H/14 (Figure 3); and (2) a corridor across the St. Croix Highlands and onto the New Brunswick lowlands, primarily NTS map areas 21 G/1, G/2, G/7, G/10, and G/11 (Figure 3). Field work involved examination and description of stratigraphic sections; examination of bedrock outcrops exhibiting multiple glacial striae orientations (Figure 6); and description, sampling, and till fabric analysis at selected till exposures.

In 1988, 1:50 000 scale surficial mapping and till sampling at one sample per 4 km² was conducted by A.G. Pronk and M.A. Parkhill in the Riley Brook area, 21 O/3 (Figure 3). The geological setting of the study

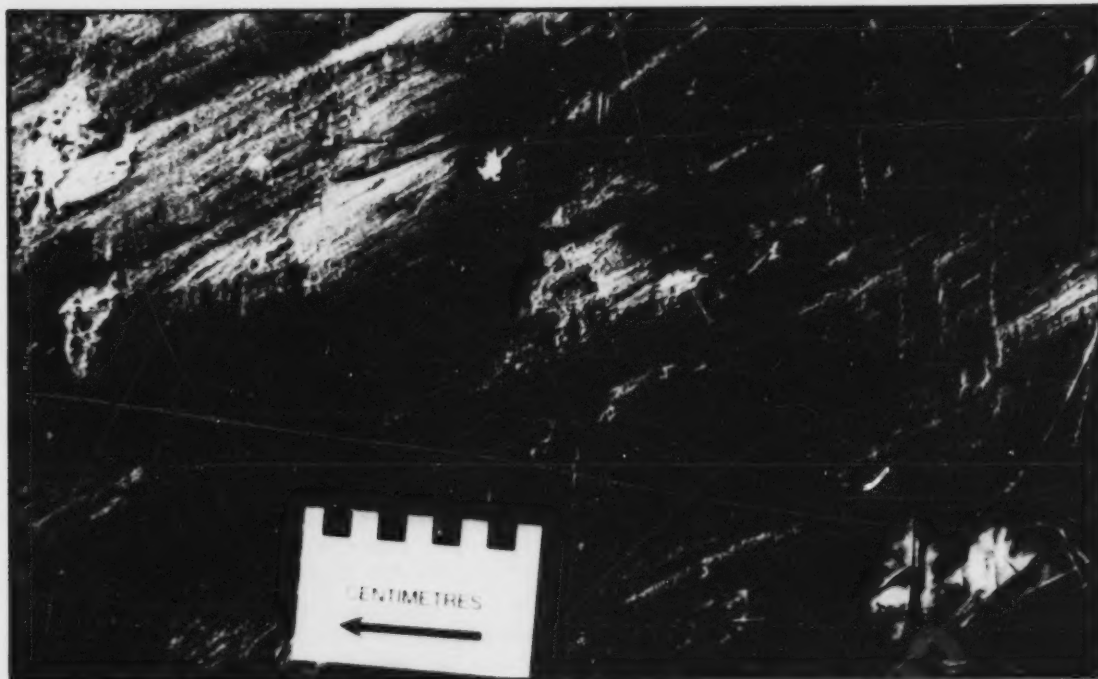


Figure 6. The glacial striae shown here infer three directions of glacial ice flow.

area is similar to the previously investigated Upsalquitch Forks area with its known gold. Simultaneously, the Geological Survey of Canada carried out a detailed stream-sediment survey in the same area. These data sets will give on-going exploration a solid working base (Figure 7).

DRILL CORE MANAGEMENT⁹ A new drill core storage facility was constructed in Fredericton at the Hugh John Flemming Forestry Centre. The building houses approximately 40 000 m of core and has a large heated viewing room with rock- and core-cutting saws. The core from the Soils and Minerals Lab and the York Street facility has been moved into the new building.

Approximately 23 000 m of drill core was donated to the Province this year. The majority of the core was drilled for gold in the Bathurst camp and was delivered to the Madran repository (see page 9). The twenty drill core storage sheds constructed at the Madran site should be able to house approximately 300 000 m of core.

The Department's computerized data base for storing drill core information is being updated.

MINERAL EXPLORATION STIMULATION PROGRAMME (MESP)⁹ The Province funded this programme in 1988 to stimulate exploration. An initial \$150 000 was set aside for grants up to \$10 000 per project. Demand was so great that an additional \$50 000 was added to the programme. A committee of five Department geologists and an industry geologist reviewed 43 applications and approved 33 totalling \$200 000. The programme proved to be very popular and requests continued to arrive after the funds were depleted.



Figure 7. A till sampling survey in the Rocky Brook area indicated anomalous Au and Ag values. Using the data, Lacana Mining Corporation Limited discovered the Rocky Brook Au-Ag showing. In this exploration trench at Rocky Brook, bedrock is overlain by till that is capped by colluvium.

MINERAL DEPOSIT INVENTORY¹⁰ The comprehensive sulphide deposits study in northern New Brunswick was extended to include all the major metallic mineral deposits in New Brunswick. The purpose of the project is to update the available geological information on mineral deposits. This computerized information will be used by the Province to more effectively manage its mineral resources. Several companies have been actively involved in compiling the data, which is confidential except to provincial government employees and to the owners of the deposit.

Several massive sulphide deposits have been found in northern New Brunswick and extensive work has been done by various companies on these deposits. Geological Surveys Branch geologists have prepared confidential reports on the Stratmat and Key Anacon deposits. Work on the Halfmile Lake deposit was near completion and work on the Murray Brook deposit was in progress (Figure 3).

Three gold deposits (Cape Spencer, owned by Gordex Minerals Limited; Millican Lake, owned by Mispac Resources Inc.; Alcida, owned by Lacana Mining Corporation) have been discovered in the last few years. All available data have been entered into the computer. Manipulation of the data on the Alcida deposit is complete and work on Millican Lake and Cape Spencer is in progress.

The data on approximately 500 drill holes from the Lake George deposit (Figure 3) have been entered into the computer. Detailed analysis of the data will be carried out in the coming year. Data from the Burnthill deposit (Figure 3) drill holes have also been entered.

Geoscientific Data Section¹¹

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The Geoscientific Data Section consists of the following staff members: Donald J.J. Carroll (Coordinator), L. Gerard Johnson (Cartographic Technician), Terry Leonard (Cartographic Technician), Ken Mersereau (Publications Officer), Carol M. LeBlanc (Microfiche/Assessment Files Officer), Barbara M.W. Carroll (Geoscience Editor), Shasta A. Abbott (Assistant Geoscience Editor, MDA), Karen A. Gallagher (Report Typist, MDA).

The Geoscientific Data Section is responsible for providing a variety of geoscientific, technical, and support services to the staff of the Minerals and Energy Division. In addition, the staff of the Section provide assistance to the public, in particular the mineral industry, by supplying publications on the geology and mineral resources of the Province.

The Geoscientific Data Section is made up of three work units, Geoscientific Editorial Services, Geoscientific Cartographic Services, and Geoscientific Information Services (Figure 1a).

The year 1988 represented a period of increased activity for the staff of the Geoscientific Data Section. This was due to several factors, two main ones being the increase in mineral exploration activity in the Province and the increase in scientific work being published and released under the Canada - New Brunswick Mineral Development Agreement (1984-89).

Some of the activities carried out during the calendar year 1988 are summarized below.

GEOSCIENTIFIC EDITORIAL SERVICES This unit edits and/or prepares for publication all geoscientific reports and maps that are produced by or for the Division. In 1988, the staff of the section edited and/or prepared for publication 41 reports and approximately 315 maps.

GEOSCIENCE PUBLICATIONS Geoscientific Information Services plays an important role in the dissemination of geoscientific data to the mineral exploration industry as well as to engineers, consultants, and the general

public. This section also distributes data on New Brunswick that has been prepared by or for the Geological Survey of Canada. Some of these were funded under the Canada - New Brunswick Mineral Development Agreement.

In 1988, the Geoscientific Data Section released more than 280 publications (65% increase over 1987) consisting of plates (mainly maps) and reports and involving six public releases of Geological Survey of Canada geochemical and airborne geophysical survey results and six releases of the Minerals and Energy Division geological and geochemical survey results. These surveys were funded under the Canada - New Brunswick Mineral Development Agreement (1984-89). The releases are listed below.

Geological Survey of Canada maps and reports were released on the following dates:

- June 30, 1988 Maps: High resolution aeromagnetic and vertical gradiometer surveys in the Bathurst area, New Brunswick. Scale: 1:20 000. (NTS 21 O/1a,b,c,d,e,f,g,h; 21 O/2a,b,g,h; 21 O/7a,b,c,d,e,f,g,h; 21 O/8c,d,e,f; 21 O/10a,b,c,d,g,h; 21 P/4c,d,e,f).
- July 27, 1988 Maps: Geophysical series of airborne gamma-ray spectrometric, VLF and magnetic survey, Woodstock-Fredericton area, New Brunswick. Scale: 1:50 000 and 1:150 000. (NTS 21 G/3,5,6,10,11,12,13,14,15; 21 J/2,3,4,5,6,7). Plates 88-25A to 88-38G; 88-39 to 88-41.
- August 9, 1988 Report: Regional stream and lake sediment and water geochemical reconnaissance data, New Brunswick. (Parts of NTS 21 G and 21 H). Geological Survey of Canada, Open File 1638.
- October 24, 1988 Report: Till geochemistry over the northern part of the Miramichi Zone and vicinity (New Brunswick); A progress report. (Parts of NTS 21 O/8,16; 21 P/5,12,13). Geological Survey of Canada, Open File 1909. Plates 88-80 to 88-86 accompany this report.
- October 24, 1988 Maps: High resolution aeromagnetic total field and vertical gradiometer surveys in the Bathurst area, New Brunswick. Scale: 1:50 000. (NTS 21 O/1,2,7,8,10; 21 P/4W).
- December 7, 1988 Maps: Geophysical series of airborne gamma-ray spectrometric, VLF and magnetic survey, Andover-Riley Brook area. Scale: 1:50 000 and 1:150 000. (NTS 21 O/3,4E,6E; 21 J/11W,12,13,14). Plates 88-88 to 88-157.

Minerals and Energy Division maps and reports were released on the following dates:

- May 25, 1988 Report: Surficial geology and till geochemistry (Au, As, Sb, Hg, Bi, Cu, Pb, Zn, Ag, Mn, Fe, Co, Ni, Mo) of

Atholville (NTS 21 O/15) map area and part of Escuminac (NTS 22 B/1) and Oak Bay (NTS 22 B/2) map areas, New Brunswick. Geological Notes Series PM 88-10. Plates 88-10A to 10D and 88-11A to 11D accompany this report.

- June 14, 1988 Report: Lithogeochemistry (including gold) of altered and mineralized samples from the Burnthill Brook area (NTS 21 J/10,15) of central New Brunswick. Geoscience Report 88-1. Plates 86-241A, 87-55A, and 87-57A accompany this report.
- June 14, 1988 Maps: Analysis of previously collected geochemical samples for arsenic, antimony, barium and gold content of stream and spring sediments. (NTS 21 J/6E,6W,7W,10E,10W,11E,14E,15E). Plates 76-76h, 76-77h, 76-78h, 76-79h, 79-45g, 79-47g, 80-27h, 80-28i.
- June 23, 1988 Maps: Surficial geology and till geochemistry (Au, Ag, Sb, Cu, Pb, Zn, Mo, W, Co, Ni, V, Fe, Mn) of the Rollingdam map area (east half) (NTS 21 J/6E). Plates 88-15A, 15B, 15C.
- November 8, 1988 Report: Lithogeochemistry of selected rock samples, Riley Brook East (NTS 21 O/3E) map area, New Brunswick. Geological Notes Series PM 88-43. Plate 88-43 accompanies this report.
- December 7, 1988 Report: Application of satellite and airborne geophysical imagery in the search for massive sulphide deposits, Heath Steele area. (part of NTS 21 O/8E). Open File Report 88-23. Plate 88-44 accompanies this report.

The distribution and sales of geoscience publications from the Fredericton office in the 1988 calendar year totalled 8673 maps and reports, representing revenue of \$22 317. The majority of these sales were to individuals working for the mineral exploration industry.

GEOSCAN The Geoscientific Data Section continued to input data into the national bibliographic data base called GEOSCAN. In 1988 more than 100 mineral assessment files were added to the New Brunswick portion of this extensive data base.

In order to assist the users of the assessment data files, the Section produces several custom indexes each year. In 1988 a special custom index on New Brunswick records that contain gold references was produced as a hand out specifically for "Gold Symposium New Brunswick 1988" held in June.

In addition, a comprehensive, up-to-date index to all New Brunswick assessment records within GEOSCAN was produced and displayed at the Minerals and Energy Division's 13th annual Review of Activities. A questionnaire was provided to determine our clientele's interest in obtaining copies of such indexes. These indexes cover the years 1951 to 1988 and are available in hard copy or microfiche formats.

MINERAL EXPLORATION ASSESSMENT FILES A total of 163 assessment files were received by the Mining Recorder's office in the 1988 calendar year. These files were reviewed to see that they complied with New Brunswick Regulation 86-98 under the Mining Act, then were indexed for GEOSCAN purposes and later microfilmed.

Anyone wishing to purchase copies of assessment data on microfiche should contact Precision Microfilming Services, 6100 Young Street, Halifax, N.S. B3K 2A4.

AUDIOVISUAL PRODUCTS The Geoscientific Information Services unit maintains a library of audiovisual productions related to the geology and mineral resources of New Brunswick as well as additional programmes that may be of interest to the general public. The following are available on a loan basis.

1. "The Appalachian Story" - (video)
2. "Forging a Greater Future" - (video)
3. "New Brunswick Peat" - (slide/tape)
4. "Salt of the Earth" - Land and Sea production - (video)
5. "Gold Fever" - Land and Sea production - (video)

Anyone wishing to borrow these audiovisual programmes are requested to contact the Geoscientific Data Section in Fredericton. The address and telephone number are given on page 18.

PUBLIC AWARENESS ACTIVITIES During 1988 the Geoscientific Data Section was once again involved in activities to increase the general public's awareness of New Brunswick's rich and diversified mineral resources.

Several discussions were held with the New Brunswick Mining Association on the topic of increasing the profile of New Brunswick's mineral sector. The Association would like to see more general information on our provincial mineral resources made available and decided to go ahead with the production of a video programme as well as to publish a colour brochure highlighting its members and their products. A committee consisting of Ms. J. MacDonald (New Brunswick Mining Association), Mr. A. Young (Brunswick Mining and Smelting Corporation Limited) and Mr. D.J.J. Carroll (Geological Surveys Branch) held several meetings in 1988 to discuss the content of the Association's awareness programme.

In conjunction with the goal to communicate the importance of our rich resource base, activities to publicize the work done under the Canada - New Brunswick Mineral Development Agreement (1984-89) were continued by the Section. A summary of these activities follows:

DISPLAYS One of the most effective ways to communicate a message about a subject is to produce general or technical displays and to exhibit this material in a variety of venues whether it be in a shopping mall or at a scientific meeting.

In 1988, the Section was involved in the production of several displays and attended the following meetings and conferences with display units:

1. 57th Annual Meeting and Convention of the Prospectors and Developers Association, Toronto (March)
2. 8th Industrial Minerals International Congress, Boston (April)
3. "Gold Symposium New Brunswick 1988," Saint John (June)
4. CIM District 1 Meeting, Fredericton (September)
5. 13th annual Review of Activities (Minerals and Energy Division), Fredericton (November)

In order to attract mineral investment to New Brunswick, the Department must promote our mineral wealth as well as our commitment to funding geoscientific projects that will assist the industry in the search and development of our resource base. In 1988 two displays were produced that fell within these goals.

The first display produced by the Geological Surveys Branch under the MDA was specifically targetted to the mineral exploration sector and was exhibited at the 57th Annual Meeting and Convention of the Prospectors and Developers Association in Toronto as part of the Provincial Geologists' geoscience exhibit. The contents of the exhibit highlighted the work of our geologists in various parts of the Province. This exhibit was also used at "Gold Symposium New Brunswick 1988" that was held in Saint John.

The second display, whose theme was "New Brunswick's diversified industrial mineral base," was created for the 8th Industrial Minerals International Congress that was held in Boston, Massachusetts. More than 600 delegates from all parts of the world attended this conference. This display was also utilized at the Canadian Institute of Mining and Metallurgy (CIM) District 1 Meeting that was held in Fredericton. The theme of the District 1 Meeting was "Atlantic Canada's Mines: Consumers and Producers."

In addition to the aforementioned technical displays, a more general unit was produced that was aimed at high school students. This display and accompanying brochure publicizes the various technical and professional jobs that are available within New Brunswick's mineral resource sector. This project was produced for Energy, Mines and Resources Canada, Communications Branch, under the MDA. This display along with the Province's potash display, was exhibited at the CIM District 1 Meeting and the 13th annual Review of Activities.

EDUCATION PROJECT Another project funded by Energy, Mines and Resources Canada, Communications Branch, under the MDA, involved the researching and production of a manuscript on the subject of New Brunswick's mineral history. Ms. G. Martin of Language Unlimited is undertaking the project, which is scheduled for completion by March 1990.

PHOTOGRAPHIC LIBRARY The Geoscientific Data Section maintains an extensive library of colour and black and white photographs of mineral-resource-related subjects. Periodically these are updated with more recent images. In 1988, one of the projects funded under the MDA was the updating of aerial photographs of the major mineral deposit sites in northern New Brunswick. The following properties were photographed: Caribou, Heath Steele-Stratmat, Murray Brook, and Restigouche (see Chapter 3).

Each year the Section receives several requests from staff, other

government departments, and the media for the use of photographic images concerning geological or mineral-related subjects.

REVIEW OF ACTIVITIES The 1988 Review of Activities of the Minerals and Energy Division was held on November 14th and 15th at the Fredericton Inn. More than 240 individuals representing the mineral industry, university, general public, research institutions, engineering consulting firms, and various federal and provincial government departments were in attendance. In addition to technical sessions, there was a poster session consisting of more than 30 exhibits of on-going projects, including those funded under the MDA (Figure 8).

MINERAL DEVELOPMENT BRANCH¹²

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The Mineral Development Branch is composed of the Director's office and four sectors: Nonmetallic Minerals, Process Engineering, Mine Engineering, and Mineral Lands. The Nonmetallic Minerals Sector is responsible for industrial minerals, nonmetallic minerals, peat and coastal zone, and sand and gravel (Figure 1c).



Figure 8. (L to R) William F. Denny, Dr. J.L. Davies, Hon. Morris Green, and Sheila Watters discuss the Cape Spencer mapping project at the Review of Activities.

The Mineral Development Branch's overall goals are to ensure that mineral deposits are developed at the optimum rate consistent with long-term income and employment objectives, to enhance the viability of marginally economic mineral deposits, to ensure that inactive mining operations are rehabilitated to a state that would avoid on-going costs to the public and, where possible can be economically productive in other uses, to ensure the highest degree of in-province processing and to maximize recovery, both in the mining and primary processing stages.

At year's end, the Mineral Development Branch administered the Mining Act, the Quarriable Substances Act, and the Ownership of Minerals Act. Copies of these Acts and Regulations thereunder are available from the Queen's Printer.

Nonmetallic Minerals Sector

Industrial Minerals Geologist: Timothy C. Webb
Nonmetallic Minerals Geologist: D.V. Venugopal
Peat and Coastal Zone Geologist: Jacques J. Thibault
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

INDUSTRIAL MINERALS¹⁴ In October, the position of Nonmetallic Minerals Geologist was filled by D.V. Venugopal.

Three Division employees, Tim Webb, Dean Thibault, and Don Carroll, attended the 8th Industrial Minerals' International Congress in Boston in April. It provided a unique opportunity for the Division to obtain information on contemporary technology from an international team of experts regarding a wide range of industrial mineral commodities and related issues. As well, the Province had the opportunity to publicize its industrial minerals to an international audience by means of a specially prepared display and related publications (Figure 9).

It is becoming increasingly important to sufficiently identify Provincial limestone deposits with respect to quality, apparent reserves, and factors affecting potential development in order to confront the anticipated rigid market requirements of the future. As a move in this direction, the New Brunswick Department of Natural Resources and Energy is currently re-examining and reassessing the Province's limestone resources, found principally in rocks of Precambrian, Silurian, and Mississippian age. The project consists of five main phases that address such topics as historical development and current status of the limestone industry, and practical geologic aspects of known deposits and occurrences. A number of important deposit characteristics (grade ranges, reserves, development potential, etc.) is to be combined into a computerized information retrieval system for quick reference.

The present status and related outputs of this project are summarized in the text that follows and Figure 10.

The 1988 outputs of the limestone resource inventory project consist of: (a) Draft report and accompanying 1:10 000 scale maps concerning various aspects of Silurian and Ordovician limestone deposits in the Province; (b) Computerized sample inventory having related information on more than 1500 entries; (c) Summary of relevant information for 400 drill holes, and setting up of a computerized data retrieval system; (d) Preparation of a deposit classification and rating scheme for Silurian and Ordovician limestones to indicate future development potential.

Several nonmetallic mineral projects, funded through the Canada - New Brunswick Mineral Development Agreement, were initiated (*) and/or completed (**) in 1988. These were: (1) a study of potassium sulphate technology and North American marketing**, (2) a study of U.S. East Coast industrial mineral markets**, (3) a study pertaining to industrial mineral production and consumption in New Brunswick*, (4) preparation of a specimen catalogue and colour brochure on New Brunswick's dimension stone resources**, (5) a regional reconnaissance of dimension stone resources (Figure 11)*, (6) a study documenting New Brunswick's building and decorative stone heritage (Figure 11)*, (7) an assessment of bedrock aggregate resource potential of selected map areas*, (8) a cement market review*, (9) a mineral filler market review: with potential implications for New Brunswick**, (10) a study dealing with promotional avenues pertaining to distribution of information regarding New Brunswick dimension stone resources*, (11) establishment of a data base for granular aggregate resources**, and (12) an aggregate market study for New Brunswick and Nova Scotia**.



Figure 9. (L to R) Tim Webb and Dean Thibault greet visitors to the Minerals and Energy Division display at the 8th Industrial Minerals' International Congress in Boston.

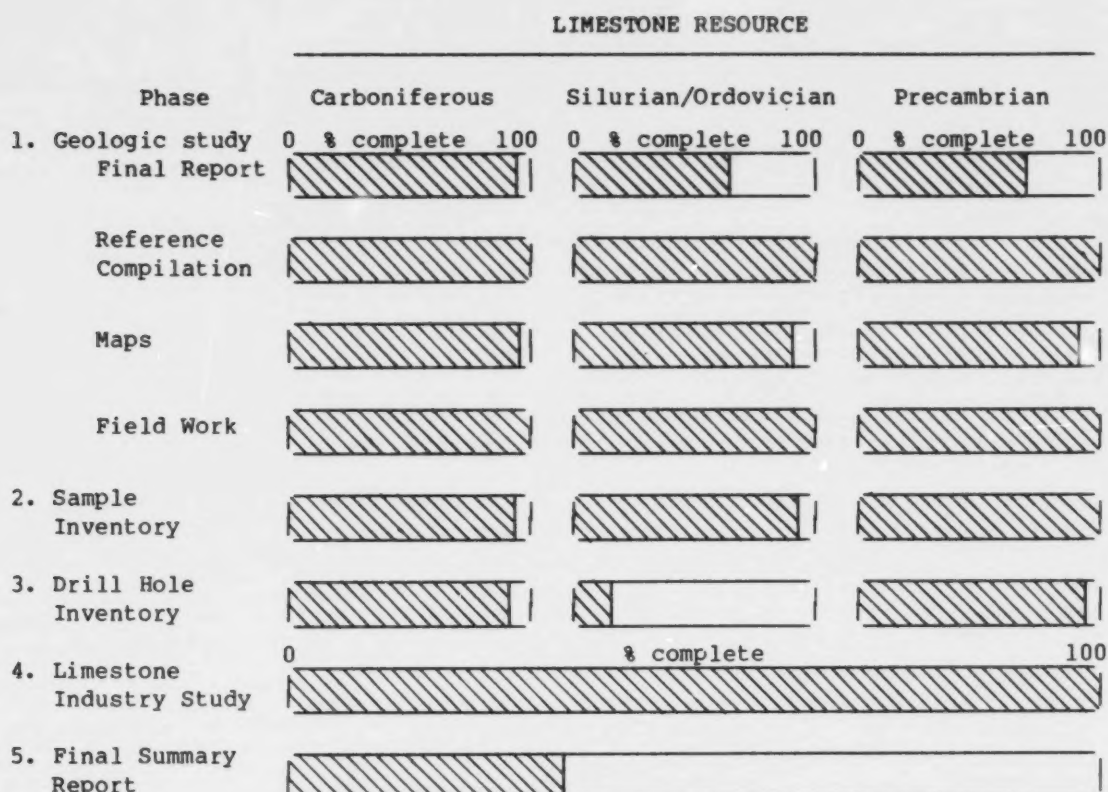


Figure 10. Status of the limestone resource inventory project in 1988.

PEAT¹³ Applications continued to be received for Peatland Exploration Licences.

The Mineral Development Branch continued to actively support the Peat Research and Development Centre in Shippagan. Under the Canada - New Brunswick Mineral Development Agreement, a project to study reclamation options for abandoned commercial peatlands was carried out by the research centre. The principle objective of the study was to complete a comprehensive bibliographical research on the possible uses of commercial bogs after depletion of the sphagnum peat reserves. The report was published as Open File Report 88-7.

A project to evaluate potential sites for ecological reserves on peatlands was funded jointly by the Minerals and Energy Division and the Fish and Wildlife Branch of the Department of Natural Resources and Energy. The objective of the project, carried out by Three-D GeoConsultants Ltd. of Fredericton, was to identify peatlands that are representative candidates of the seven peatland regions of New Brunswick. Some of these sites may eventually become ecological reserves.

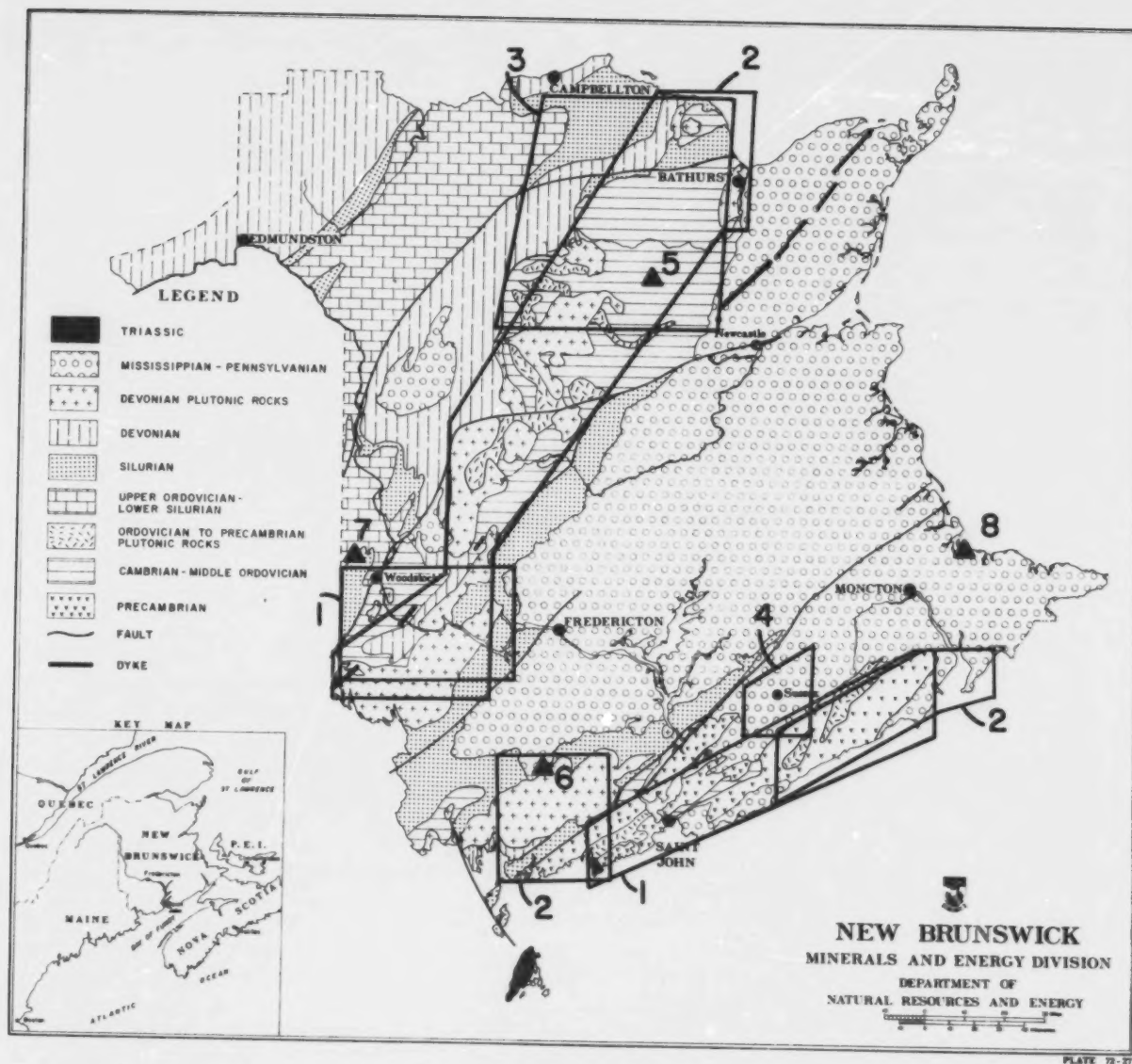


Figure 11. Areas in which Mineral Development Branch projects were conducted in 1988: (1) bedrock aggregate resource assessment; (2) dimension stone resource inventory; (3) custom mill for chemical extraction of refractory gold ores; (4) process to manufacture fertilizer-grade potassium sulphate; (5) Heath Steele waste-rock study; (6) beneficiation of fluorite; (7) synthetic magnesium oxide production; (8) beach nourishment, Parlee Beach Provincial Park, Shediac.

For each Crown peatland under lease, two maps have been prepared from aerial photographs obtained in June 1988. One map shows the land usage and the other the drainage network. The maps, drawn at the 1:10 000 scale, will be released following field verifications in 1989.

The Provincial Peat Data Base has been adapted for use on micro-computer. A user's manual is in preparation and the data base will eventually be distributed as a series of dBase III+ files.

A project to investigate peatland resource management using SPOT was awarded to GEODAT Information Services Ltd. of Fredericton. The objective of the project is to test the feasibility of updating 1:10 000 maps of production bogs using satellite imagery. Preliminary results indicate that a high proportion of the drainage network can be delineated. The project is funded under the Canada - New Brunswick Mineral Development Agreement. The final report will be presented in early 1989.

Jacques Thibault attended the VIII International Peat Congress that was held in Leningrad, U.S.S.R., in August of 1988. The event was well attended: 617 registered participants from 27 countries including 20 from Canada. A total of 146 papers were presented and published in a four-volume set. A number of field excursions and study tours were also offered to participants. Jacques visited the "Fornosovo" peat enterprise (Figure 12), which produces baled peat and dry-pressed peat boards. He also had the opportunity to visit the Peat Institute of the Byelorussian Academy of Sciences in Minsk and to tour a peat briquette factory near Soligorsk. The U.S.S.R. presently dominates world peat production and is a leader in its utilization. Of special interest was the composting of animal waste with peat, a major agricultural activity there. Perhaps the same approach could be used in Canada to help turn some environmental problems into productive solutions.

COASTAL ZONE¹³ The second segment of an 11-hour colour video recording of the New Brunswick coastline was released by the Geological Survey of Canada as Open File 1979 and is entitled "The Coast of New Brunswick from Saint John Harbour to Cape Enrage," by J. Thibault and D. Frobel. Other one-hour segments are in preparation.

In cooperation with the Department of Tourism and Cultural Heritage, a beach nourishment plan was prepared for Parlee Beach Provincial Park near Shediac (Figures 11 and 13). The objective of the project is to counter coastal erosion and backshore susceptibility to storm damage. The project involves moving sand from an adjacent intertidal sand platform to the beach zone in order to raise and widen the backshore.

AGGREGATE RESOURCE INVENTORY⁸ The last reports for the granular aggregate inventory programme were released in 1988. These were: Open File Report 88-1 (Waterford, Salmon River), 88-2 (St. George), 88-3 (Grand Manan and Campobello Island), and 88-4 (Hampstead). Following completion of the aggregate resource inventory, Allan Seaman, Quaternary Geologist, was transferred to the Geoscientific Services Section of the Geological Surveys Branch (see page 15).

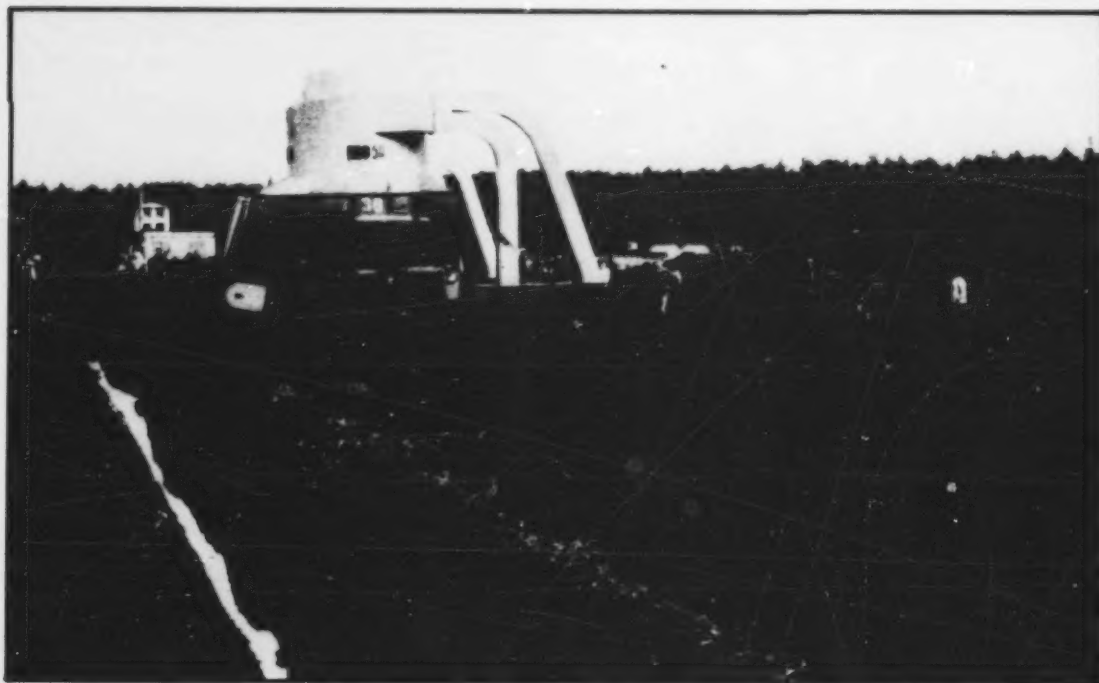


Figure 12. Pneumatic harvester in action at the "Fornosovo" peat enterprise, near Pavlovsk, U.S.S.R.

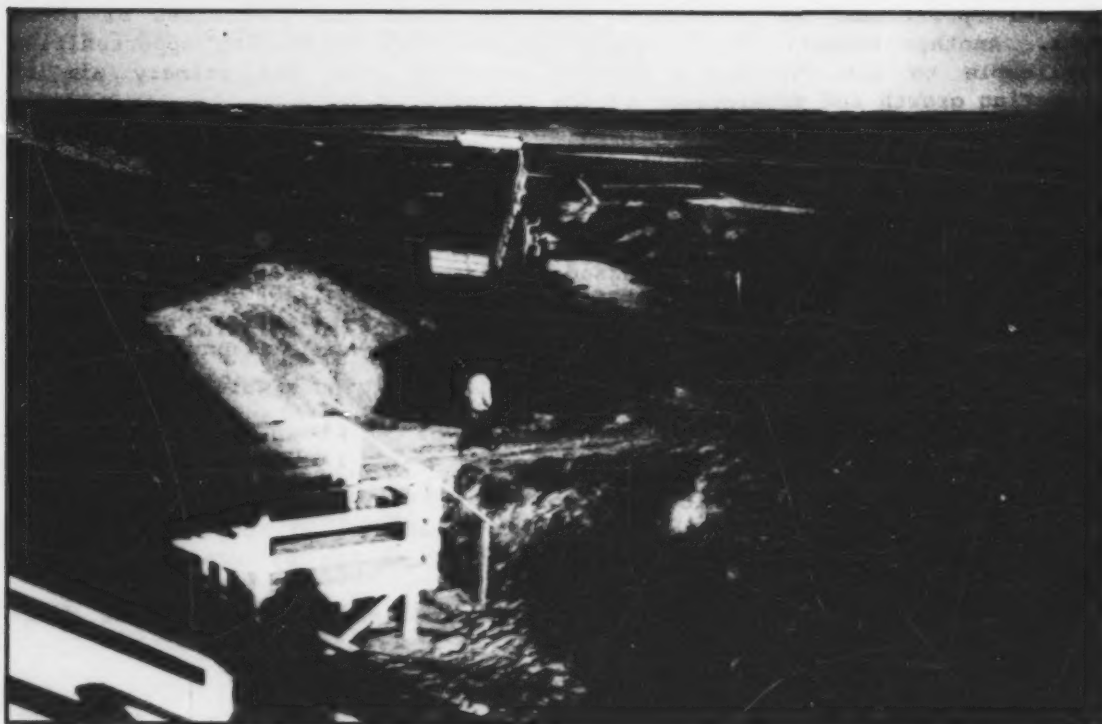


Figure 13. Beach nourishment project at Parlee Beach, Shediac, New Brunswick.

AGGREGATE MATERIALS^{14,15} In New Brunswick, the rights to quarriable substances, including ordinary stone, building or construction stone, sand, gravel, clay and soil, are vested in the landowner who thereby controls extraction activities. Approximately 42% of the land area of the Province is Crown land. Removal of aggregate materials from Crown lands is regulated under the Quarriable Substances Act, with permits being issued by the Minister of Natural Resources and Energy.

Production of aggregates from Crown lands in 1988 was 2 986 633 t compared to 2 863 457 t in 1987. Revenue generated from these aggregates in 1988 amounted to \$465 415.01. The market value was in excess of \$5 000 000.

Process Studies Group¹⁶

Process Engineer: Robert D. Harris (Acting)
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-7937

In September of 1988, J. Dean Thibault, Process Engineer, left the Department; Robert Harris took over his responsibilities.

The process engineering function within the Department of Natural Resources and Energy is responsible for providing specialist input to the administration of the Mining Act and Metallic Minerals Tax Act. This applies to the review and assessment of feasibility reports, research and development projects, and reclamation programmes of current and developing mineral operations, in accordance with the terms and provisions of these acts. Another mandate is to review and identify processing opportunities applicable to the Province's mineral industry with the primary aim of promoting growth and development of the industry.

Many of the development initiatives sponsored by this sector are supported and funded by way of the Canada - New Brunswick Mineral Development Agreement (MDA) under the Economic and Regional Development Agreement. Over the year, several MDA projects and programmes were managed by this sector and these are discussed below:

MINERAL INVESTMENT STIMULATION PROGRAMME (MISP) The MISP is a grant programme under the Agreement and is designed to fund mineral development projects proposed by industry. Many projects were submitted for funding under the programme over the course of the year and those approved for financial support are:

1. Canadian Occidental Petroleum Limited: to determine the reactive calcium content of the Albert County oil shale deposits.
2. Dominion Explorers Inc.: to assess the nature and scope of the gold association in drill-tested areas at Lake George by re-analysing old drill core (Figure 14).
3. Dickenson Mines Ltd.: to extend the reserve tonnage base of the McGee and Samphill limestone deposits.



Figure 14. Charles Morrissy (Mine Manager, Dominion Explorers Inc.) and Colin McFarlane examine core at the Lake George mine site. This project is part of the Mineral Investment Stimulation Programme, funded under the Canada - New Brunswick Mineral Development Agreement.

4. Mispac Resources Inc.: to extend the tonnage and grade of the "Road Zone" gold deposit at Cape Spencer.

MINERAL PROCESSING INVESTIGATIONS PROGRAMME (MPIP) This is an in-house laboratory programme designed to encourage development of our mineral resources by seeding mineral processing ideas. The activities in 1988 focused primarily on industrial minerals. The work included synthetic wollastonite production from limestone and silica, extraction of manganese from the Plymouth deposits, and beneficiation of fluorspar from Mount Pleasant tungsten ores (Figure 11).

CUSTOM PROCESSING OF REFRACTORY GOLD ORES This project was contracted to P.J. Whalen, P. Eng., of Fredericton. Its purpose is to review the concept of custom milling the potential refractory gold resources of northern New Brunswick (Figure 11), and to assess appropriate technologies applicable to these resources as an incentive for further developments. The laboratory test programme was based on a bulk sample taken from Lacana's Alcida deposit, north-northwest of Bathurst. Completion of the project is scheduled for March, 1989.

POTASSIUM SULPHATE PROCESS DEVELOPMENT STUDY This project was originated as a possible development concept for add-on processing of potash. It consists of manufacturing fertilizer-grade potassium sulphate and by-product calcium chloride from indigenous potash and gypsum (Figure 11). The

bulk of the work was contracted to Cambrian Minerals Ltd. of Montreal. Cambrian completed a prefeasibility study of this concept, and the Department has been promoting the merits of this work so that industry will further develop the concept at the pilot-plant scale.

Mine Engineering Sector¹⁷

Mining Engineer: Samuel K. McEwan, P. Eng.
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

The Mine Engineering Sector consists of Samuel K. McEwan, P. Eng. (Mining Engineer) and Robert Butler, P. Eng. (Reclamation Engineer). The sector is responsible for work of both a specific and general nature relating to the mining industry of New Brunswick.

Responsibilities include the monitoring of mining activities; compilation and analysis of mining statistics; administration of the Mining Act; review and evaluation of feasibility reports, annual mining plans, and reclamation reports; and administration of Mineral Development Agreement (MDA) projects.

In addition to these specific tasks, the Mine Engineering Section liaised with the Federal government and other provincial governments on matters related to the mining industry.

RECLAMATION¹⁸ In 1988, there were six reclamation plans submitted for review. As of December 31, 1988, four approvals were issued with two projects still under consideration.

N.B. Coal Limited disturbed 120 ha of land in 1988, but has reclaimed in excess of 290 ha. All other mining companies have maintained their reclamation on disturbed land in accordance with their approved schedules.

East West Caribou Mining Limited has agreed to rehabilitate the old Anaconda mine site as part of its approved reclamation plan.

The Province has provided financial assistance and technical support on various reclamation and rehabilitation programmes. An example is the support given to Brunswick Mining and Smelting Corporation Limited on its Heath Steele waste-rock study (Figures 11 and 15). This project is designed to investigate the capping of waste-rock piles to lower or prevent acid generation.

The Department of Natural Resources and Energy has representation on the Technical Working Group of the Mine Environment Neutral Drainage (MEND) programme. MEND is a cooperative programme involving industry and the Federal and Provincial governments. The group coordinates programmes initiated by members who manage and attempt to prevent acid generation from sulphide-bearing mine wastes.

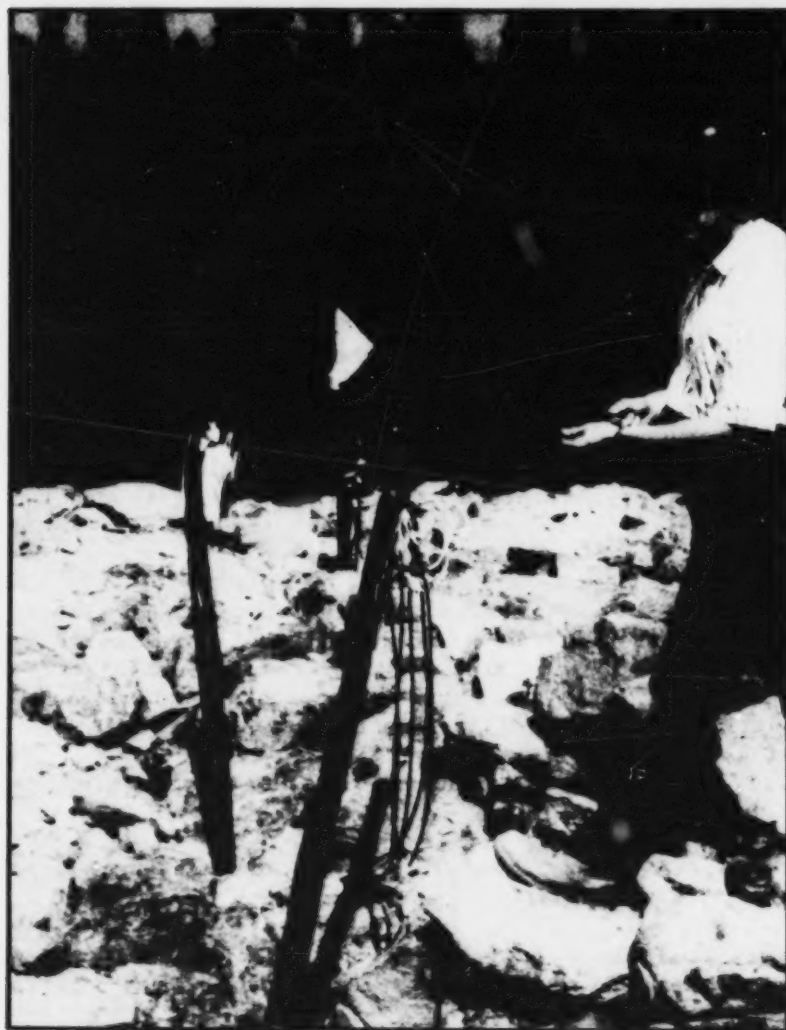


Figure 15. Sam McEwan examines the monitoring equipment at the Heath Steele waste-rock study site.

Mineral Lands Section¹⁹

Chief Mining Recorder: Eugene V. Jackson
Address: P.O. Box 60Q0, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

The Mineral Lands Section processes and maintains records pertaining to the disposition of Crown-owned mineral rights. Mining claims are recorded and prospecting licences are sold in Fredericton and at the regional offices in Bathurst and Sussex.

Mineral Lands staff in 1988 consisted of E.V. Jackson, Chief Mining Recorder; F.J. Edney, Deputy Recorder; and P. Evans, Cartographic Technician.

The number of claims staked in each of the metallogenic zones is illustrated in Figure 16 and the total annual expenditures reported for assessment credit (1954-1988) are given in Figure 17. Table 1 presents mineral lands statistics for 1988.

MINE TAXATION²⁰

Mine Assessor: Wayne R. Carr
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2468

The Mine Assessor, W.R. Carr, reports to the Director of Financial Services and is responsible for the collection of all revenue due the Province from mineral taxation and royalties.

The duties of the Mine Assessor involve the administration of various acts as they relate to the collection of taxes and royalties due the Province. These Acts are: Metallic Minerals Tax Act, Mining Act, Quarriable Substances Act, Oil and Natural Gas Act.

The metal mines subject to the Metallic Minerals Tax Act submit annual tax returns that are audited and additional assessments are issued if required. On-site audits are now being carried out on companies subject to this act to determine compliance. The taxes due are monitored and collected on a regular basis as outlined by the Metallic Minerals Tax Act.

Audits are also performed on producers of other commodities to determine compliance of the appropriate acts.

Royalties are collected as follows: Monthly - coal, natural gas; Quaterly - potash, salt, oil; Semi-Annually - peat moss, sand and gravel.

An annual conference is held for the Provincial Mine Assessors to discuss topics related to taxation, royalties and legislation, and problems associated with the collection of same.

MINING COMMISSIONER'S REPORT¹⁹

Mining Commissioner: Richard N. Renouf
Address: P.O. Box 7, Florenceville, N.B. E0J 1K0
Telephone: 392-5506

Mr. Renouf's three-year term as Mining Commissioner commenced on June 9, 1988. By year's end he had begun investigation of three cases.

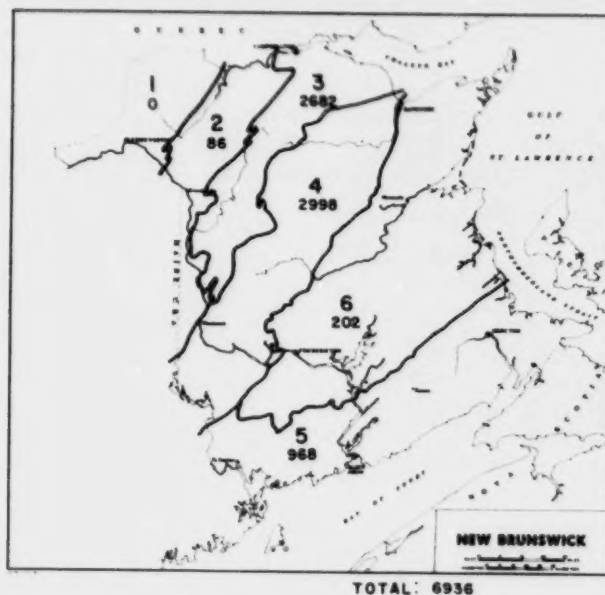


Figure 16. Number of claims staked by metallogenic region in 1988.

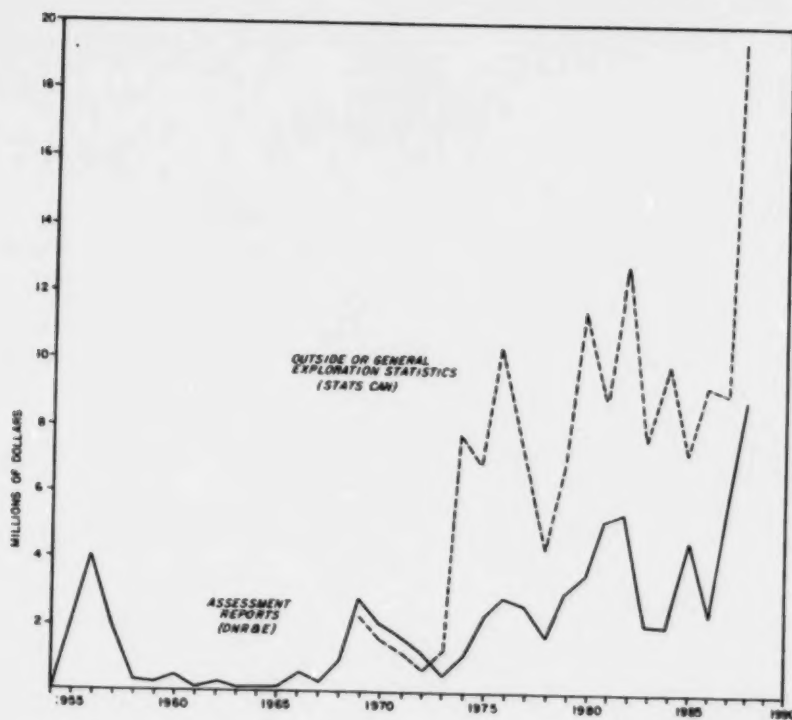


Figure 17. Total annual expenditures reported for assessment credit, 1954-1988.

TABLE 1. MINERAL LANDS AND EXPLORATION STATISTICS, 1988

MINERAL LANDS STATISTICS	No.	Claim Equivalent	Hectares	% Inc. Over Prev. Year (Decrease)
Prospecting Licences Sold*	195	-	-	(10)
Claims Recorded	6 936	6 936	110 976	53
Claims Renewed	8 211	8 211	131 376	36
Claims Expired	1 839	1 839	29 424	(38)
Claims in Effect**	15 899	15 899	254 384	51
Mining Licences Renewed	40	1 795	28 720	(64)
Mining Licences Expired	67	2113	33 808	347
Mining Licences in Effect**	40	1 795	28 720	(64)
Coal Licences in Effect**	1	5 818	93 088	0
Potash Leases in Effect**	3	2 355	38 130	0
Other Leases in Effect**	8	696	11 136	59
Total Claims and Claim Equivalents in Effect**	26 664	26 664	426 624	14
Oil-Gas Licences	2	-	66 072	(91)***
Oil-Gas Leases	4	-	13 289	84***
Bituminous Shale Licences	1	-	8 998	0
Bituminous Shale Development Permits	-	-	-	-
Bituminous Shale Leases	1	-	1 439	0
Underground Storage Licences	-	-	-	-
Underground Storage Leases	-	-	-	5
Quarry Permits	366	-	-	0
Quarry Leases	7	-	481.27	(34)***
Peat Licences (issued 1988)	3	-	1 174	9***
Peat Leases**	26	-	10 573	
Potash Exploration Reservations	-	-	-	-

EXPLORATION STATISTICS	Number	Depth (m)	Value (\$)
Assessment Reports	163		9 054 777
Exploration Reported Drilling	376 holes	32 868	2 032 826
Potash Exploration Expenditure			-
Drilling	-	-	-
Oil-Gas Exploration Expenditure			-
Drilling	-	-	-
Bituminous Shale Expenditure			-

Note: After July 6, 1986, mining licences no longer issued.

* Prospecting licences are now issued for life

** In effect at year's end

*** Based on number of hectares

August 1, 1989

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PLATES

	Arsenic, antimony, barium and gold content of stream and spring sediments. L.R. Fyffe. (1988). Scale: 1:50 000.
MP 76-76h	Napadogan, west half (21 J/7W)
MP 76-77h	Hayesville, east half (21 J/10E)
MP 76-78h	Hayesville, west half (21 J/10W)
MP 76-79h	Juniper, east half (21 J/11E)

- Arsenic, antimony, barium and gold content of stream and spring sediments. L.R. Fyffe. (1988). Scale: 1:50 000.
- MP 79-45g Plaster Rock, east half (21 J/14E)
- MP 79-47g Tuadook Lake, east half (21 J/15E)
- MP 80-27h Coldstream, west half (21 J/6W)
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- MP 88-3 Geological maps, 1987 to date.
- MP 88-4 Bituminous shale Licence to Search and Lease location map, southwestern New Brunswick (21 H/15). C. St. Peter. (1987). Scale: 1:50 000.
- Index to map plates of New Brunswick, 1974 to date. Compiled by L.G. Johnson. (1988). Scale: 1:500 000.
- MP 88-5 Metallic minerals
- MP 88-6 Industrial minerals
- MP 88-7 Fuels and peat
- Index to map plates of New Brunswick. Compiled by L.G. Johnson. (1988). Scale: 1:500 000.
- MP 88-8 1:50 000 scale geological compilation maps
- MP 88-9 1:50 000 scale mineral occurrence maps
- Surficial geology and till geochemistry of the Atholville (21 O/15) map area, New Brunswick. A.G. Pronk and M.A. Parkhill. (1988). See PM 88-10. Scale: 1:50 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- MP 88-10A Surficial geology
- MP 88-10B Au, As, Sb, Hg, and Bi values in till
- MP 88-10C Cu, Pb, Zn, and Ag values in till
- MP 88-10D Mn, Fe, Co, Ni, and Mo values in till
- Surficial geology and till geochemistry of part of the Escuminac (22 B/1) and Oak Bay (22 B/2) map areas, New Brunswick. A.G. Pronk and M.A. Parkhill. (1988). See FM 88-10. Scale: 1:50 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- MP 88-11A Surficial geology
- MP 88-11B Au, As, Sb, Hg, and Bi values in till
- MP 88-11C Cu, Pb, Zn, and Ag values in till
- MP 88-11D Mn, Fe, Co, Ni, and Mo values in till

- Metallogeny of the Woodstock area, New Brunswick (21 J/3,4).**
R.D. Thomas and C.F. Gleeson. (1988). See GSC-OF 1726.
(Canada - New Brunswick Mineral Development Agreement
1984-89).
- MP 88-12** Map 1. Mineral occurrences, Woodstock, New Brunswick. Scale:
 1:25 000.
- MP 88-13** Table 1. Summary of mineral occurrences.
- MP 88-14** Geology of eastern Caledonian Highlands, New Brunswick (parts
 of 21 H/6,10,11,14,15). S.M. Barr. (1988). See GSC-OF 1774.
 Scale: 1:50 000. (Canada - New Brunswick Mineral Development
 Agreement 1984-89).
- Surficial geology and till geochemistry of the Rollingdam map**
area (east half), New Brunswick (21 G/6E). P.G. Chiswell and
L.R. Long. (1988). Scale: 1:50 000.
- MP 88-15A** Surficial geology
- MP 88-15B** Au, Ag, Sb, Cu, Pb, and Zn values in till
- MP 88-15C** Mo, W, Co, Ni, V, Fe, and Mn values in till
- MP 88-16** Specialty metals in New Brunswick. Three-D GeoConsultants
 Limited. (1988). See OF 88-14. Scale: 1:500 000. (Canada -
 New Brunswick Mineral Development Agreement 1984-89).
- United Oils, Limited. Well logs. United Pan Canadian**
MacLeod Brook #1. (21 H/11W). Schlumberger of Canada.
(1976).
- MP 88-17A** Borehole compensated sonic log: gamma ray and sonic
 (800-3716 ft.)
- MP 88-17B** Borehole compensated sonic log: gamma ray and sonic
 (3706-7100 ft.)
- MP 88-18A** Compensated neutron-formation density: gamma ray and bulk
 density (50-1050 ft.)
- MP 88-18B** Compensated neutron-formation density: gamma ray and bulk
 density (890-6280 ft.)
- MP 88-18C** Compensated neutron-formation density: gamma ray and bulk
 density (6270-7110 ft.), and detail log gamma ray and bulk
 density (890- 5290 ft.)
- MP 88-18D** Compensated neutron-formation density: detail log, gamma ray
 and bulk density (5280-7110 ft.)
- MP 88-19** High resolution continuous dipmeter (1026-7061 ft.)
- MP 88-20** Coriband - analysis of complex reservoirs: formation character-
 istics, identification of formation fluids, porosity and fluids
 analysis by volume, formation analysis by volume (1030-7080
 ft.)
- MP 88-21** Directional log
- MP 88-22A** Dual induction-laterolog: spontaneous-potential and conduc-
 tivity (100-7120 ft.), and detail log spontaneous-potential
 and resistivity (1010-3800 ft.)
- MP 88-22B** Dual induction-laterolog: detail log spontaneous-potential and
 resistivity (3790-7120 ft.)
- MP 88-22C** Dual induction-laterolog: spontaneous-potential and resistivity
 (90-1040 ft.), and detail log spontaneous-potential and
 resistivity (90-1040 ft.)

United Oils, Limited. Well logs. United Pan Canadian
MacLeod Brook #1. (21 H/11W). Schlumberger of Canada.
(1976).

MP 88-23 Microlaterolog and caliper log (60-1050 ft.)
MP 88-24A Microlog and caliper log (1025-3670 ft.)
MP 88-24B Microlog and caliper log (3650-7110 ft.)

Airborne gamma-ray spectrometric, VLF and magnetic survey,
Woodstock-Fredericton area, New Brunswick. Geological Survey
of Canada. (1988). Scale: 1:50 000 unless otherwise stated.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

MP 88-25A K %, St. Stephen (21 G/3).
MP 88-25B Equivalent U/Th, St. Stephen (21 G/3).
MP 88-25C Equivalent Th/K, St. Stephen (21 G/3).
MP 88-25D Equivalent U/K, St. Stephen (21 G/3).
MP 88-25E Equivalent Th, St. Stephen (21 G/3).
MP 88-25F Equivalent U, St. Stephen (21 G/3).
MP 88-25G Total Count Ur, St. Stephen (21 G/3).
MP 88-26A K %, Rollingdam (21 G/5,6).
MP 88-26B Equivalent U/Th, Rollingdam (21 G/5,6).
MP 88-26C Equivalent Th/K, Rollingdam (21 G/5,6).
MP 88-26D Equivalent U/K, Rollingdam (21 G/5,6).
MP 88-26E Equivalent Th, Rollingdam (21 G/5,6).
MP 88-26F Equivalent U, Rollingdam (21 G/5,6).
MP 88-26G Total Count Ur, Rollingdam (21 G/5,6).
MP 88-27A K %, Fredericton Junction (21 G/10).
MP 88-27B Equivalent U/Th, Fredericton Junction (21 G/10).
MP 88-27C Equivalent Th/K, Fredericton Junction (21 G/10).
MP 88-27D Equivalent U/K, Fredericton Junction (21 G/10).
MP 88-27E Equivalent Th, Fredericton Junction (21 G/10).
MP 88-27F Equivalent U, Fredericton Junction (21 G/10).
MP 88-27G Total Count Ur, Fredericton Junction (21 G/10).
MP 88-28A K %, McAdam (21 G/11).
MP 88-28B Equivalent U/Th, McAdam (21 G/11).
MP 88-28C Equivalent Th/K, McAdam (21 G/11).
MP 88-28D Equivalent U/K, McAdam (21 G/11).
MP 88-28E Equivalent Th, McAdam (21 G/11).
MP 88-28F Equivalent U, McAdam (21 G/11).
MP 88-28G Total Count Ur, McAdam (21 G/11).
MP 88-29A K %, Forest City (21 G/12).
MP 88-29B Equivalent U/Th, Forest City (21 G/12).
MP 88-29C Equivalent Th/K, Forest City (21 G/12).
MP 88-29D Equivalent U/K, Forest City (21 G/12).
MP 88-29E Equivalent Th, Forest City (21 G/12).
MP 88-29F Equivalent U, Forest City (21 G/12).
MP 88-29G Total Count Ur, Forest City (21 G/12).
MP 88-30A K %, Fosterville (21 G/13).
MP 88-30B Equivalent U/Th, Fosterville (21 G/13).
MP 88-30C Equivalent Th/K, Fosterville (21 G/13).
MP 88-30D Equivalent U/K, Fosterville (21 G/13).
MP 88-30E Equivalent Th, Fosterville (21 G/13).
MP 88-30F Equivalent U, Fosterville (21 G/13).
MP 88-30G Total Count Ur, Fosterville (21 G/13).

Airborne gamma-ray spectrometric, VLF and magnetic survey, Woodstock-Fredericton area, New Brunswick. Geological Survey of Canada. (1988). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-31A	K %, Canterbury (21 G/14).
MP 88-31B	Equivalent U/Th, Canterbury (21 G/14).
MP 88-31C	Equivalent Th/K, Canterbury (21 G/14).
MP 88-31D	Equivalent U/K, Canterbury (21 G/14).
MP 88-31E	Equivalent Th, Canterbury (21 G/14).
MP 88-31F	Equivalent U, Canterbury (21 G/14).
MP 88-31G	Total Count Ur, Canterbury (21 G/14).
MP 88-32A	K %, Fredericton (21 G/15).
MP 88-32B	Equivalent U/Th, Fredericton (21 G/15).
MP 88-32C	Equivalent Th/K, Fredericton (21 G/15).
MP 88-32D	Equivalent U/K, Fredericton (21 G/15).
MP 88-32E	Equivalent Th, Fredericton (21 G/15).
MP 88-32F	Equivalent U, Fredericton (21 G/15).
MP 88-32G	Total Count Ur, Fredericton (21 G/15).
MP 88-33A	K %, Burtts Corner (21 J/2).
MP 88-33B	Equivalent U/Th, Burtts Corner (21 J/2).
MP 88-33C	Equivalent Th/K, Burtts Corner (21 J/2).
MP 88-33D	Equivalent U/K, Burtts Corner (21 J/2).
MP 88-33E	Equivalent Th, Burtts Corner (21 J/2).
MP 88-33F	Equivalent U, Burtts Corner (21 J/2).
MP 88-33G	Total Count Ur, Burtts Corner (21 J/2).
MP 88-34A	K %, Millville (21 J/3).
MP 88-34B	Equivalent U/Th, Millville (21 J/3).
MP 88-34C	Equivalent Th/K, Millville (21 J/3).
MP 88-34D	Equivalent U/K, Millville (21 J/3).
MP 88-34E	Equivalent Th, Millville (21 J/3).
MP 88-34F	Equivalent U, Millville (21 J/3).
MP 88-34G	Total Count Ur, Millville (21 J/3).
MP 88-35A	K %, Woodstock (21 J/4).
MP 88-35B	Equivalent U/Th, Woodstock (21 J/4).
MP 88-35C	Equivalent Th/K, Woodstock (21 J/4).
MP 88-35D	Equivalent U/K, Woodstock (21 J/4).
MP 88-35E	Equivalent Th, Woodstock (21 J/4).
MP 88-35F	Equivalent U, Woodstock (21 J/4).
MP 88-35G	Total Count Ur, Woodstock (21 J/4).
MP 88-36A	K %, Florenceville (21 J/5).
MP 88-36B	Equivalent U/Th, Florenceville (21 J/5).
MP 88-36C	Equivalent Th/K, Florenceville (21 J/5).
MP 88-36D	Equivalent U/K, Florenceville (21 J/5).
MP 88-36E	Equivalent Th, Florenceville (21 J/5).
MP 88-36F	Equivalent U, Florenceville (21 J/5).
MP 88-36G	Total Count Ur, Florenceville (21 J/5).
MP 88-37A	K %, Coldstream (21 J/6).
MP 88-37B	Equivalent U/Th, Coldstream (21 J/6).
MP 88-37C	Equivalent Th/K, Coldstream (21 J/6).
MP 88-37D	Equivalent U/K, Coldstream (21 J/6).
MP 88-37E	Equivalent Th, Coldstream (21 J/6).
MP 88-37F	Equivalent U, Coldstream (21 J/6).
MP 88-37G	Total Count Ur, Coldstream (21 J/6).

Airborne gamma-ray spectrometric, VLF and magnetic survey, Woodstock-Fredericton area, New Brunswick. Geological Survey of Canada. (1988). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-38A K %, Florenceville (21 J/5).
- MP 88-38B Equivalent U/Th, Napadogan (21 J/7).
- MP 88-38C Equivalent Th/K, Napadogan (21 J/7).
- MP 88-38D Equivalent U/K, Napadogan (21 J/7).
- MP 88-38E Equivalent Th, Napadogan (21 J/7).
- MP 88-38F Equivalent U, Napadogan (21 J/7).
- MP 88-38G Total Count Ur, Napadogan (21 J/7).
- MP 88-39 VLF, total field profile maps of the entire Woodstock-Fredericton survey area. Scale: 1:250 000.
- MP 88-40 VLF, quadrature profile maps of the entire Woodstock-Fredericton survey area. Scale: 1:250 000.
- MP 88-41 Magnetic, total field profile maps of the entire Woodstock-Fredericton survey area. Scale: 1:250 000.
- MP 88-42 Table 4.11. Typical specifications for aggregate-based products. ADI Limited. (1988). See OF 88-19. (Canada - New Brunswick Mineral Development Agreement, 1984-89).
- MP 88-43 Sample locations and general geology of Riley Brook East (21 O/3E) map area, New Brunswick. R.A. Wilson and R. Sullivan. (1988). Scale: 1:50 000. See PM 88-43. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- MP 88-44 Heath Steele Mines project, land use/gossan signature search vector map compiled from LANDSAT-4 Thematic Mapper Imagery. (Part of 21 O/8E). M. Lodin and J.G. Torrance. (1988). Scale: 1:50 000. See OF 88-23. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- Base maps prepared by Minerals and Energy Division. L.G. Johnson. (1988). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- MP 88-45 21 G/6, sheet e
- MP 88-46 21 G/11, sheet c
- MP 88-47 21 G/11, sheet d
- MP 88-48 vacant
- McAdam area, parts of NTS 21 G/6 and 21 G/11, LANDSAT-MSS, lineament trend map. Geodat Information Services Ltd. (1988). Scale: 1:50 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).
- MP 88-49 NW lineaments
- MP 88-50 NE lineaments

McAdam, 21 G/11, sheets c, d; LANDSAT-MSS, lineaments. Geodat Information Services Ltd. (1988). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-51

NW lineaments

MP 88-52

N/NE/E lineaments

Rollingdam, 21 G/6, sheets e, f; LANDSAT-MSS, lineaments. Geodat Information Services Ltd. (1988). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-53

NW lineaments

MP 88-54

N/NE/E lineaments

Base maps of 21 O/9 (Tetagouche Lakes). Produced by Maritime Resource Management Service Inc. (May, 1988). Scale: 1:10 000. Contour interval, 20 m. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-55
MP 88-56
MP 88-57
MP 88-58
MP 88-59
MP 88-60
MP 88-61
MP 88-62
MP 88-63
MP 88-64
MP 88-65
MP 88-66
MP 88-67

21 O/9-101
21 O/9-102
21 O/9-103
21 O/9-104
21 O/9-105
21 O/9-201
21 O/9-202
21 O/9-203
21 O/9-204
21 O/9-205
21 O/9-301
21 O/9-302
21 O/9-303

MP 88-68 21 O/9-304
MP 88-69 21 O/9-305
MP 88-70 21 O/9-401
MP 88-71 21 O/9-402
MP 88-72 21 O/9-403
MP 88-73 21 O/9-404
MP 88-74 21 O/9-405
MP 88-75 21 O/9-501
MP 88-76 21 O/9-502
MP 88-77 21 O/9-503
MP 88-78 21 O/9-504
MP 88-79 21 O/9-505

Till geochemistry over the northern part of the Miramichi Zone and vicinity, New Brunswick. M. Lamothe. (1988). See GSC-OF 1909. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-80

Plate I. Till sample location (21 O/7,8,9,10,15,16; 21 P/5,12,13). Scale: 1:250 000.

MP 88-81

Plate II. Zinc abundance in clay fraction of till (21 O/7,8,9,10,15,16; 21 P/5,12,13). Scale: 1:250 000.

MP 88-82

Plate III. Arsenic abundance in clay fraction of till (21 O/7,8,9,10,15,16; 21 P/5,12,13). Scale: 1:250 000.

MP 88-83

Plate IV. Antimony abundance in clay fraction of till (21 O/7,8,9,10,15,16; 21 P/5,12,13). Scale: 1:250 000.

MP 88-84

Plate V. Gold abundance in silt plus clay fraction of till (21 O/7,8,9,10,15,16; 21 P/5,12,13). Scale: 1:250 000.

MP 88-85

Plate VI. Gold abundance in silt plus clay fraction of till, Bathurst, Pointe-Verte (21 P/13, part of 21 P/12). Scale: 1:50 000.

MP 88-86

Plate VII. Gold abundance in silt plus clay fraction of till, Heath Steele (for legend see plate VI) (part of 21 O/8). Scale: 1:50 000.

MP 88-87

Geology of a northern portion of the central plutonic belt, New Brunswick. (21 O/1W,2,7,8W). J.B. Whalen. (1988). Scale: 1:50 000. See GSC Open File 1908. (Canada - New Brunswick Mineral Development Agreement 1984-89).

Airborne gamma ray spectrometric, VLF and magnetic survey, Andover-Riley Brook area, New Brunswick. Geological Survey of Canada. (1988). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-88	K %, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-89	Equivalent U/Th, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-90	Equivalent Th/K, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-91	Equivalent U/K, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-92	Equivalent Th, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-93	Equivalent U, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-94	Exposure rate, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-95	VLF total field, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-96	VLF quadrature, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-97	Magnetic total field, Sisson Branch Reservoir (21 O/6E 1/2)
MP 88-98	K %, Riley Brook (21 O/3)
MP 88-99	Equivalent U/Th, Riley Brook (21 O/3)
MP 88-100	Equivalent Th/K, Riley Brook (21 O/3)
MP 88-101	Equivalent U/K, Riley Brook (21 O/3)
MP 88-102	Equivalent Th, Riley Brook (21 O/3)
MP 88-103	Equivalent U, Riley Brook (21 O/3)
MP 88-104	Exposure rate, Riley Brook (21 O/3)
MP 88-105	VLF total field, Riley Brook (21 O/3)
MP 88-106	VLF quadrature, Riley Brook (21 O/3)
MP 88-107	Magnetic total field, Riley Brook (21 O/3)
MP 88-108	K %, Grand Falls (21 O/4E 1/3)
MP 88-109	Equivalent U/Th, Grand Falls (21 O/4E 1/3)
MP 88-110	Equivalent Th/K, Grand Falls (21 O/4E 1/3)
MP 88-111	Equivalent U/K, Grand Falls (21 O/4E 1/3)
MP 88-112	Equivalent Th, Grand Falls (21 O/4E 1/3)
MP 88-113	Equivalent U, Grand Falls (21 O/4E 1/3)
MP 88-114	Exposure rate, Grand Falls (21 O/4E 1/3)
MP 88-115	VLF total field, Grand Falls (21 O/4E 1/3)
MP 88-116	VLF quadrature, Grand Falls (21 O/4E 1/3)
MP 88-117	Magnetic total field, Grand Falls (21 O/4E 1/3)
MP 88-118	K %, Aroostook (21 J/13)
MP 88-119	Equivalent U/Th, Aroostook (21 J/13)
MP 88-120	Equivalent Th/K, Aroostook (21 J/13)
MP 88-121	Equivalent U/K, Aroostook (21 J/13)
MP 88-122	Equivalent Th, Aroostook (21 J/13)
MP 88-123	Equivalent U, Aroostook (21 J/13)
MP 88-124	Exposure rate, Aroostook (21 J/13)
MP 88-125	VLF total field, Aroostook (21 J/13)
MP 88-126	VLF quadrature, Aroostook (21 J/13)
MP 88-127	Magnetic total field, Aroostook (21 J/13)
MP 88-128	K %, Plaster Rock (21 J/14)
MP 88-129	Equivalent U/Th, Plaster Rock (21 J/14)
MP 88-130	Equivalent Th/K, Plaster Rock (21 J/14)
MP 88-131	Equivalent U/K, Plaster Rock (21 J/14)

Airborne gamma ray spectrometric, VLF and magnetic survey, Andover-Riley Brook area, New Brunswick. Geological Survey of Canada. (1988). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-132	Equivalent Th, Plaster Rock (21 J/14)
MP 88-133	Equivalent U, Plaster Rock (21 J/14)
MP 88-134	Exposure rate, Plaster Rock (21 J/14)
MP 88-135	VLF total field, Plaster Rock (21 J/14)
MP 88-136	VLF quadrature, Plaster Rock (21 J/14)
MP 88-137	Magnetic total field, Plaster Rock (21 J/14)
MP 88-138	K %, Perth-Andover (21 J/12)
MP 88-139	Equivalent U/Th, Perth-Andover (21 J/12)
MP 88-140	Equivalent Th/K, Perth-Andover (21 J/12)
MP 88-141	Equivalent U/K, Perth-Andover (21 J/12)
MP 88-142	Equivalent Th, Perth-Andover (21 J/12)
MP 88-143	Equivalent U, Perth-Andover (21 J/12)
MP 88-144	Exposure rate, Perth-Andover (21 J/12)
MP 88-145	VLF total field, Perth-Andover (21 J/12)
MP 88-146	VLF quadrature, Perth-Andover (21 J/12)
MP 88-147	Magnetic total field, Perth-Andover (21 J/12)
MP 88-148	K %, Juniper (21 J/11W 1/2)
MP 88-149	Equivalent U/Th, Juniper (21 J/11W 1/2)
MP 88-150	Equivalent Th/K, Juniper (21 J/11W 1/2)
MP 88-151	Equivalent U/K, Juniper (21 J/11W 1/2)
MP 88-152	Equivalent Th, Juniper (21 J/11W 1/2)
MP 88-153	Equivalent U, Juniper (21 J/11W 1/2)
MP 88-154	Exposure rate, Juniper (21 J/11W 1/2)
MP 88-155	VLF total field, Juniper (21 J/11W 1/2)
MP 88-156	VLF quadrature, Juniper (21 J/11W 1/2)
MP 88-157	Magnetic total field, Juniper (21 J/11W 1/2)

Well logs, Stoney Creek Oil and Gas Field. (21 H/15). S.L. Foley. (Relogged, 1988). See GR 89-1. (Canada - New Brunswick Mineral Development Agreement, 1984-89).

MP 88-158A	Stoney Creek 62, 0-960 m, NBGO (see MP 83-230)
MP 88-158B	Stoney Creek 62, 960-1067 m, NBGO (see MP 83-230)
MP 88-159	Stoney Creek 68, NBGO (see MP 83-236)
MP 88-160	Stoney Creek 73, NBGO (see MP 83-241)
MP 88-161	Stoney Creek 80, NBGO (see MP 83-248)
MP 88-162	Stoney Creek 83, NBGO (see MP 83-251)
MP 88-163	Stoney Creek 84, NBGO (see MP 83-252)
MP 88-164A	Stoney Creek 91, 0-960 m, NBGO (see MP 83-259)
MP 88-164B	Stoney Creek 91, 960-1116 m, NBGO (see MP 83-259)
MP 88-165	Stoney Creek 97, NBGO (see MP 83-265)
MP 88-166	Stoney Creek 109, NBGO (see MP 83-277)
MP 88-167	Stoney Creek 113, NBGO (see MP 83-281)
MP 88-168	Stoney Creek 114, NBGO (see MP 83-282)
MP 88-169	Stoney Creek 121, NBGO (see MP 83-287)
MP 88-170A	Stoney Creek 126, 0-960 m, NBGO (see MP 83-292)
MP 88-170B	Stoney Creek 126, 960-1199 m, NBGO (see MP 83-292)
MP 88-171A	Stoney Creek 128, 0-960 m, NBGO (see MP 83-294)
MP 88-171B	Stoney Creek 128, 960-1389 m, NBGO (see MP 83-294)
MP 88-172	Stoney Creek 131, NBGO (see MP 83-297)

Well logs, Stoney Creek Oil and Gas Field. (21 H/15).
S.L. Foley. (Relogged, 1988). See GR 89-1. (Canada - New
Brunswick Mineral Development Agreement, 1984-89).

MP 88-173 Stoney Creek 133, NBGO (see MP 83-299)
MP 88-174 Stoney Creek 134, NBGO (see MP 83-300)
MP 88-175A Stoney Creek 137, 0-960 m, NBGO (see MP 83-303)
MP 88-175B Stoney Creek 137, 960-1097 m, NBGO (see MP 83-303)
MP 88-176A Stoney Creek 138, 0-960 m, NBGO (see MP 83-304)
MP 88-176B Stoney Creek 138, 960-995 m, NBGO (see MP 83-304)
MP 88-177 Stoney Creek 140, NBGO (see MP 83-306)
MP 88-178 Stoney Creek 144, NBGO (see MP 83-310)
MP 88-179 Stoney Creek 145, NBGO (see MP 83-311)
MP 88-180 Stoney Creek 147, NBGO (see MP 83-313)
MP 88-181 Stoney Creek 148, NBGO
MP 88-182A Stoney Creek 149, 0-960 m, NBGO (see MP 83-314)
MP 88-182B Stoney Creek 149, 960-1081 m, NBGO (see MP 83-314)
MP 88-183 Stoney Creek 153, NBO
MP 88-184 Stoney Creek 156, NBO
MP 88-185 Stoney Creek 157, NBO
MP 88-186 Stoney Creek 158, NBGO (see MP 83-317)
MP 88-187 Stoney Creek 161, NBO (see MP 83-318)
MP 88-188 Stoney Creek 163, NBGO (see MP 83-320)

MP 88-189 Geology of Rollingdam map area, sheet e (NTS 21 G/6e), New
Brunswick. L.R. Fyffe. (1988). Scale: 1:20 000. (Canada
- New Brunswick Mineral Development Agreement 1984-89).

MP 88-190 Geology of McAdam map area, sheet c (NTS 21 G/11c), New
Brunswick. L.R. Fyffe. (1988). Scale: 1:20 000. (Canada
- New Brunswick Mineral Development Agreement 1984-89).

MP 88-191 Geology of McAdam map area, sheet d (NTS 21 G/11d), New
Brunswick. L.R. Fyffe. (1988). Scale: 1:20 000. (Canada
- New Brunswick Mineral Development Agreement 1984-89).

New Brunswick Standard Lithologic Well Log (blank form).

MP 88-192A Part I
MP 88-192B Part II
MP 88-192C Part III

New Brunswick Geocompilation Project maps (21 O/8-101).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

MP 88-193A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
MP 88-193B Geology overlay, layer 2.
MP 88-193C Geophysics overlay, layer 3.
MP 88-193D Geochemistry overlay (Cu, Ag), layer 4.
MP 88-193E Annotation overlay, layer 5.
MP 88-193F Composite compilation map, layers 1, 2, 3, 4. See OF 89-8.

New Brunswick Geocompilation Project maps (21 O/8-102).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

MP 88-194A

Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).

MP 88-194B

Geology overlay, layer 2.

MP 88-194C

Geophysics overlay, layer 3.

MP 88-194D

Geochemistry overlay (As, Pb, Ag), layer 4a.

MP 88-194E

Geochemistry overlay (Cu), layer 4b.

MP 88-194F

Geochemistry overlay (Zn, Ni), layer 4c.

MP 88-194G

Annotation overlay, layer 5a.

MP 88-194H

Annotation overlay, layer 5b.

MP 88-194J

Composite compilation map, layers 1, 2, 3, 4a. See OF 89-9.

MP 88-194K

Composite compilation map, layers 1, 2, 3, 4b. See OF 89-9.

MP 88-194L

Composite compilation map, layers 1, 2, 3, 4c. See OF 89-9.

New Brunswick Geocompilation Project maps (21 O/8-103).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

MP 88-195A

Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).

MP 88-195B

Geology overlay, layer 2.

MP 88-195C

Geophysics overlay, layer 3.

MP 88-195D

Geochemistry overlay (Pb), layer 4a.

MP 88-195E

Geochemistry overlay (Cu), layer 4b.

MP 88-195F

Geochemistry overlay (Zn), layer 4c.

MP 88-195G

Annotation overlay, layer 5.

MP 88-195H

Composite compilation map, layers 1, 2, 3, 4a. See OF 89-10.

MP 88-195J

Composite compilation map, layers 1, 2, 3, 4b. See OF 89-10.

MP 88-195K

Composite compilation map, layers 1, 2, 3, 4c. See OF 89-10.

New Brunswick Geocompilation Project maps (21 O/8-104).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

MP 88-196A

Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).

MP 88-196B

Geology overlay, layer 2.

MP 88-196C

Geophysics overlay, layer 3.

MP 88-196D

Geochemistry overlay (Pb, Ag), layer 4a.

MP 88-196E

Geochemistry overlay (Zn, Cu), layer 4b.

MP 88-196F

Annotation overlay, layer 5.

MP 88-196G

Composite compilation map, layers 1, 2, 3, 4a. See OF 89-11.

MP 88-196H

Composite compilation map, layers 1, 2, 3, 4b. See OF 89-11.

New Brunswick Geocompilation Project maps (21 O/8-105).
K.D.A. Whaley. (Compiled, 1987). See OF 89-7 (user's
guide and map legends). Scale: 1:10 000. (Canada - New
Brunswick Mineral Development Agreement 1984-89).

- MP 88-197A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
MP 88-197B Geology overlay, layer 2.
MP 88-197C Geophysics overlay, layer 3.
MP 88-197D Geochemistry overlay (Cu, Pb, Zn, Mn, hmt), layer 4.
MP 88-197E Annotation overlay, layer 5.
MP 88-197F Composite compilation map, layers 1, 2, 3, 4. See OF 89-12.

New Brunswick Geocompilation Project maps (21 O/8-201).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

- MP 88-198A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
MP 88-198B Geology overlay, layer 2.
MP 88-198C Geophysics overlay, layer 3.
MP 88-198D Geochemistry overlay (Cu, Ag), layer 4.
MP 88-198E Composite compilation map, layers 1, 2, 3, 4. See OF 89-13.

New Brunswick Geocompilation Project maps (21 O/8-202).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

- MP 88-199A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
MP 88-199B Geology overlay, layer 2.
MP 88-199C Geophysics overlay, layer 3.
MP 88-199D Geochemistry overlay (Pb, Ag), layer 4a.
MP 88-199E Geochemistry overlay (Cu, Au, Ag), layer 4b.
MP 88-199F Geochemistry overlay (Zn, As), layer 4c.
MP 88-199G Annotation overlay, layer 5a.
MP 88-199H Annotation overlay, layer 5b.
MP 88-199J Annotation overlay, layer 5c.
MP 88-199K Composite compilation map, layers 1, 2, 3, 4a. See OF 89-14.
MP 88-199L Composite compilation map, layers 1, 2, 3, 4b. See OF 89-14.
MP 88-199M Composite compilation map, layers 1, 2, 3, 4c. See OF 89-14.

New Brunswick Geocompilation Project maps (21 O/8-203).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).

- MP 88-200A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
MP 88-200B Geology overlay, layer 2.
MP 88-200C Geophysics overlay, layer 3.
MP 88-200D Geochemistry overlay (Cu, Pb, Zn), layer 4.
MP 88-200E Annotation overlay, layer 5a.
MP 88-200F Annotation overlay, layer 5b.
MP 88-200G Composite compilation map, layers 1, 2, 3, 4. See OF 89-15.

- New Brunswick Geocompilation Project maps (21 O/8-204).
K.D.A. Whaley. (Compiled, 1986). See OF 89-7 (user's guide
and map legends). Scale: 1:10 000. (Canada - New
Brunswick Mineral Development Agreement 1984-89).**
- MP 88-201A** Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
- MP 88-201B** Geology overlay, layer 2.
- MP 88-201C** Geophysics overlay, layer 3.
- MP 88-201D** Geochemistry overlay (Cu, Pb, Zn, Au), layer 4.
- MP 88-201E** Annotation overlay, layer 5.
- MP 88-201F** Composite compilation map, layers 1, 2, 3, 4. See OF 89-16.
- New Brunswick Geocompilation Project maps (21 O/8-205).
K.D.A. Whaley. (Compiled, 1986). See OF 89-7 (user's guide
and map legends). Scale: 1:10 000. (Canada - New
Brunswick Mineral Development Agreement 1984-89).**
- MP 88-202A** Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
- MP 88-202B** Geology overlay, layer 2.
- MP 88-202C** Geophysics overlay, layer 3.
- MP 88-202D** Geochemistry overlay (Cu, Pb, Zn, Hg, hmt), layer 4.
- MP 88-202E** Annotation overlay, layer 5.
- MP 88-202F** Composite compilation map, layers 1, 2, 3, 4. See OF 89-17.
- New Brunswick Geocompilation Project maps (21 O/8-301).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).**
- MP 88-203A** Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
- MP 88-203B** Geology overlay, layer 2.
- MP 88-203C** Geophysics overlay, layer 3.
- MP 88-203D** Composite compilation map, layers 1, 2, 3. See OF 89-18.
- New Brunswick Geocompilation Project maps (21 O/8-302).
Three-D GeoConsultants Limited. (Compiled, 1986). See OF
89-7 (user's guide and map legends). Scale: 1:10 000.
(Canada - New Brunswick Mineral Development Agreement
1984-89).**
- MP 88-204A** Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
- MP 88-204B** Geology overlay, layer 2.
- MP 88-204C** Geophysics overlay, layer 3.
- MP 88-204D** Geochemistry overlay (Cu, Pb, Zn), layer 4.
- MP 88-204E** Annotation overlay, layer 5.
- MP 88-204F** Composite compilation map, layers 1, 2, 3, 4. See OF 89-19.

New Brunswick Geocompilation Project maps (21 O/8-303). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-205A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-205B Geology overlay, layer 2.
- MP 88-205C Geophysics overlay, layer 3.
- MP 88-205D Geochemistry overlay (Cu, Pb, Zn, Hg), layer 4.
- MP 88-205E Annotation overlay, layer 5.
- MP 88-205F Composite compilation map, layers 1, 2, 3, 4. See OF 89-20.

New Brunswick Geocompilation Project maps (21 O/8-304). K.D.A. Whaley. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-206A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-206B Geology overlay, layer 2.
- MP 88-206C Geophysics overlay, layer 3.
- MP 88-206D Geochemistry overlay (Cu, Pb, Zn), layer 4.
- MP 88-206E Annotation overlay, layer 5.
- MP 88-206F Composite compilation map, layers 1, 2, 3, 4. See OF 89-21.

New Brunswick Geocompilation Project maps (21 O/8-305). K.D.A. Whaley. (Compiled, 1987). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-207A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-207B Geology overlay, layer 2.
- MP 88-207C Geophysics overlay, layer 3.
- MP 88-207D Geochemistry overlay (Cu, Pb, Zn, Ag, hm), layer 4a.
- MP 88-207E Geochemistry overlay (Cu), layer 4b.
- MP 88-207F Geochemistry overlay (Zn), layer 4c.
- MP 88-207G Annotation overlay, layer 5.
- MP 88-207H Composite compilation map, layers 1, 2, 3, 4a. See OF 89-22.
- MP 88-207J Composite compilation map, layers 1, 2, 3, 4b. See OF 89-22.
- MP 88-207K Composite compilation map, layers 1, 2, 3, 4c. See OF 89-22.

New Brunswick Geocompilation Project maps (21 O/8-401). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-208A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-208B Geology overlay, layer 2.
- MP 88-208C Geophysics overlay, layer 3.
- MP 88-208D Geochemistry overlay (Cu, Pb, Zn, Ag), layer 4.
- MP 88-208E Annotation overlay, layer 5.
- MP 88-208F Composite compilation map, layers 1, 2, 3, 4. See OF 89-23.

New Brunswick Geocompilation Project maps (21 O/8-402). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-209A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
MP 88-209B Geology overlay, layer 2.
MP 88-209C Geophysics overlay, layer 3.
MP 88-209D Geochemistry overlay (Cu, Pb, Zn), layer 4.
MP 88-209E Annotation overlay, layer 5.
MP 88-209F Composite compilation map, layers 1, 2, 3, 4. See OF 89-24.

New Brunswick Geocompilation Project maps (21 O/8-403). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-210A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
MP 88-210B Geology overlay, layer 2.
MP 88-210C Geophysics overlay, layer 3.
MP 88-210D Geochemistry overlay (Cu, Pb, Zn, As, Ni, Co, Sr, Mn, Ba, Mo, Ag), layer 4.
MP 88-210E Annotation overlay, layer 5.
MP 88-210F Composite compilation map, layers 1, 2, 3, 4. See OF 89-25.

New Brunswick Geocompilation Project maps (21 O/8-404). K.D.A. Whaley. (Compiled, 1987). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-211A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
MP 88-211B Geology overlay, layer 2.
MP 88-211C Geophysics overlay, layer 3.
MP 88-211D Geochemistry overlay (Cu, Pb, Zn, As, Ni, Co, Sr, Mn, Ba, Mo, Ag), layer 4.
MP 88-211E Annotation overlay, layer 5.
MP 88-211F Composite compilation map, layers 1, 2, 3, 4. See OF 89-26.

New Brunswick Geocompilation Project maps (21 O/8-405). K.D.A. Whaley. (Compiled, 1987). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 88-212A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
MP 88-212B Geology overlay, layer 2.
MP 88-212C Geophysics overlay, layer 3.
MP 88-212D Geochemistry overlay (Cu, Pb, Zn, hm), layer 4.
MP 88-212E Annotation overlay, layer 5.
MP 88-212F Composite compilation map, layers 1, 2, 3, 4. See OF 89-27.

New Brunswick Geocompilation Project maps (21 O/8-501). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-213A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-213B Geology overlay, layer 2.
- MP 88-213C Geophysics overlay, layer 3.
- MP 88-213D Geochemistry overlay (Cu, Pb, Zn, Au, Ag), layer 4.
- MP 88-213E Annotation overlay, layer 5.
- MP 88-213F Composite compilation map, layers 1, 2, 3, 4. See OF 89-28.

New Brunswick Geocompilation Project maps (21 O/8-502). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-214A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-214B Geology overlay, layer 2.
- MP 88-214C Geophysics overlay, layer 3.
- MP 88-214D Geochemistry overlay (Cu, Pb, Zn, Ag, Mn), layer 4.
- MP 88-214E Annotation overlay, layer 5.
- MP 88-214F Composite compilation map, layers 1, 2, 3, 4. See OF 89-29.

New Brunswick Geocompilation Project maps (21 O/8-503). Three-D GeoConsultants Limited. (Compiled, 1986). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-215A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-215B Geology overlay, layer 2.
- MP 88-215C Geophysics overlay, layer 3.
- MP 88-215D Geochemistry overlay (Pb, Ag, Mn), layer 4a.
- MP 88-215E Geochemistry overlay (Cu, Zn), layer 4b.
- MP 88-215F Annotation overlay, layer 5.
- MP 88-215G Composite compilation map, layers 1, 2, 3, 4a. See OF 89-30.
- MP 88-215H Composite compilation map, layers 1, 2, 3, 4b. See OF 89-30.

New Brunswick Geocompilation Project maps (21 O/8-504). K.D.A. Whaley. (Compiled, 1987). See OF 89-7 (user's guide and map legends). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

- MP 88-216A Topographic base, layer 1. Maritime Resource Management Service Inc. (1986).
- MP 88-216B Geology overlay, layer 2.
- MP 88-216C Geophysics overlay, layer 3.
- MP 88-216D Geochemistry overlay (Cu, Pb, Zn, Ag, hm), layer 4.
- MP 88-216E Annotation overlay, layer 5.
- MP 88-216F Composite compilation map, layers 1, 2, 3, 4. See OF 89-31.

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- New Brunswick Geocompilation Project maps (21 O/8-505).
K.D.A. Whaley. (Compiled, 1986). See OF 89-7 (user's
guide and map legends). Scale: 1:10 000. (Canada - New
Brunswick Mineral Development Agreement 1984-89).
- MP 88-217A Topographic base, layer 1. Maritime Resource Management
Service Inc. (1986).
- MP 88-217B Geology overlay, layer 2.
- MP 88-217C Geophysics overlay, layer 3.
- MP 88-217D Geochemistry overlay (Cu, Zn), layer 4.
- MP 88-217E Annotation overlay, layer 5.
- MP 88-217F Composite compilation map, layers 1, 2, 3, 4. See OF 89-32.
- New Brunswick Geocompilation Project work location maps
(21 O/8). Three-D GeoConsultants Limited and K.D.A. Whaley.
(Compiled, 1986). See OF 89-7 (user's guide and map
legends). Scale: 1:50 000. (Canada - New Brunswick
Mineral Development Agreement 1984-89).
- MP 88-218A For the period 1950-59.
- MP 88-218B For the period 1960-69.
- MP 88-218C For the period 1970-79.
- MP 88-218D For the period 1980-86 (September).

CHAPTER 2. MINERAL EXPLORATION IN NEW BRUNSWICK

METALLIC MINERALS

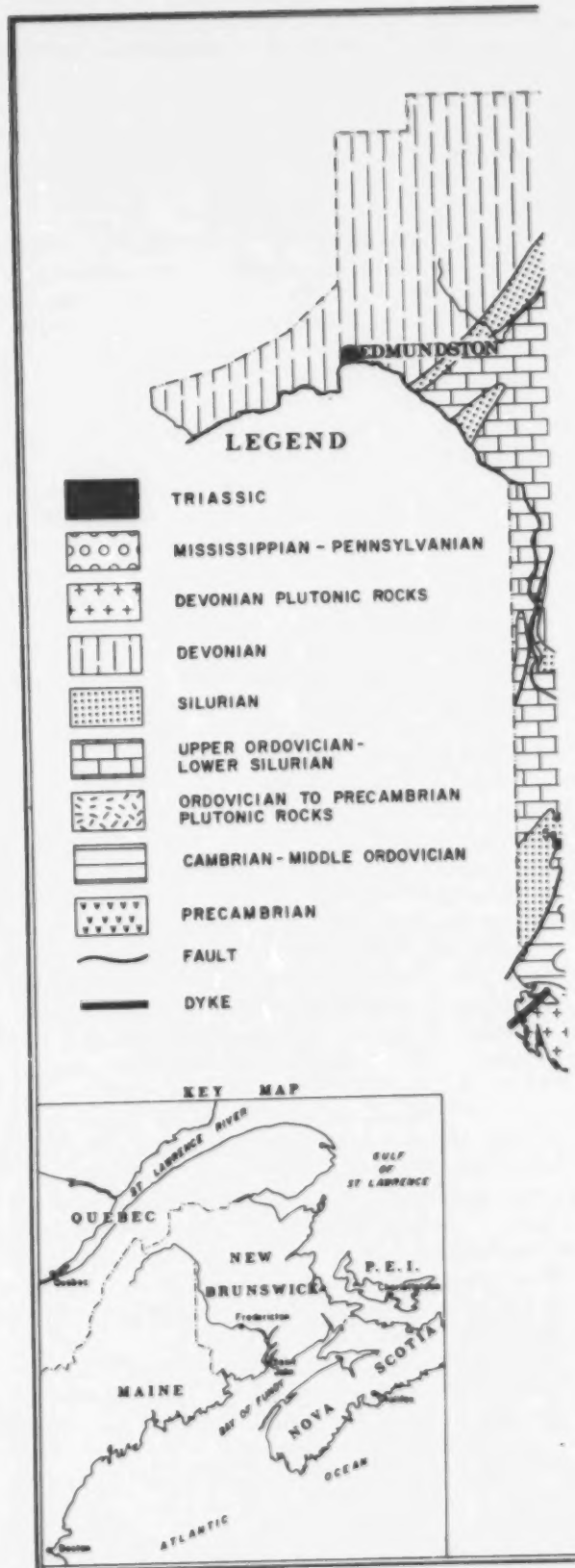
SUMMARY OF EXPLORATION ACTIVITY^{4,5} Precious metals were the focus of most exploration activity in northern New Brunswick during 1988, especially in the Siluro-Devonian volcanic belt (Tobique-Chaleur Zone). However, unlike previous years, there was considerable interest in base-metal-plus-gold properties. Several major and junior companies were active as were a number of prospectors.

Of the major companies working in northern New Brunswick, **Moranda Exploration Company, Limited** (including Brunswick Mining and Smelting Corporation Limited) worked mainly on base-metal properties in the Ordovician Tetagouche Group, particularly in the Heath Steele-Halfmile Lake area, 50 km northwest of Newcastle (Figure 18). The company also explored its gold properties in the Upsalquitch and Millstream areas, 70 km west and 15 km northwest of Bathurst, respectively. **Corona Corporation** (Lacana Mining Corporation and others, prior to July 1st) drilled more than 3000 m on its Rocky Brook property, an epithermal, precious-metal play in the Tobique-Chaleur Zone, 35 km south of Dalhousie. Additional claims were staked and further work is planned. Corona also drilled four deep holes in its Elmtree gold deposit, and as a result has traced mineralization to a vertical depth of about 240 m. **Falconbridge Limited** just completed another 1800 m of drilling on its Nash Creek base-metal property 30 km southeast of Dalhousie, and will be drilling several holes near Slacks Lake, a joint-venture property with **Acadia Mineral Ventures Limited** and **Seabright Exploration Inc.** The Slacks Lake property is an antimony-bearing, epithermal play about 25 km southwest of Heath Steele. **Inco Gold Company** and **Rio Algom Limited** acquired land positions in the Tobique-Chaleur Zone and conducted preliminary exploration programmes. **Granges Exploration Ltd.** uncovered a significant epithermal gold showing at Middle River, about 25 km west-southwest of Bathurst. It is hosted by Tetagouche Group sedimentary rocks. Granges also did further drilling on its nickel property near Goodwin Lake, about 25 km west of Heath Steele.

A new junior company came to northern New Brunswick as a result of a Minerals and Energy Division display at the Annual Meeting and Convention of the Prospectors and Developers Association in Toronto. **NovaGold Resources Inc.** staked more than 500 claims in the Tobique-Chaleur Zone and also acquired the Murray Brook base-metal-plus-gold deposit from **Northumberland Mines Limited**. The company is currently drilling one property and is preparing the Murray Brook site for a heap-leach operation to recover gold from the gossan that overlies the sulphide deposit. **Marshall Minerals Corp.** is currently definition drilling the Restigouche base-metal deposit, 70 km west-southwest of Bathurst. **Acadia Mineral Ventures Limited** conducted approximately 15 000 m of diamond drilling on several properties in the Millstream area, located 15 km northwest of Bathurst.

LEGEND FOR FIGURE 18

1. Northeast Exploration Services Limited
2. Brunswick Mining and Smelting Corporation Limited
3. Norman Pitre
4. A. Wayne Lockhart
5. Maritime Resource Research Ltd.
6. David Dupre
7. Four Seasons Resources Limited and Fred Cady
8. Owen Hickey
9. Thomas Jamieson
10. Lacana Mining Corporation Limited
11. Caribou New Brunswick Mining Limited
12. Camille McLaughlin
13. Seabright Resources Inc.
14. Kenneth D.A. Whaley
15. Peter Jamieson
16. Fred Cady
17. Merton Stewart
18. Aurtec Incorporated
19. Acadia Mineral Ventures Limited
20. Shamrock Resources Inc.
21. Michael Smith and A. Ben Baldwin
22. Michael McCombe, Sr.
23. Acadia Mineral Ventures Limited and Norman Pitre
24. Sharpe Energy and Resources Limited
25. Noranda Exploration Company, Limited
26. Sevogle Exploration Inc.
27. Wayne Carroll
28. Granges Exploration Ltd.
29. Claude Willett
30. Murray Brook Resources Incorporated and Martin D. Kierans
31. Donald C. Graham
32. Ian A. Graham
33. Umex Inc.
34. John A. Duffy
35. Kidd Creek Mines Ltd.
36. Arnold Somers
37. Dominion Explorers Inc.
38. Morton Gordon
39. Cobrun Mining Corporation
40. Goldfluor Exploration Limited
41. Peter Fenety and Roy McIntyre
42. Gilbert Frenette
43. William Carter
44. Edgar Brown
45. Grand Empire Exploration Limited
46. Roy McIntyre and Peter Fenety
47. Falconcrest Resources Inc.
48. Peter Fenety, Roy McIntyre, and Kenneth D.A. Whaley
49. Atlantic Goldfields Inc.
50. Derek F. Brown
51. LAC Minerals Limited
52. Lombard Consolidated Resources Inc.
53. Newbrun Resources Ltd.
54. William Walton
55. Great Horn Mining, Inc.
56. Robert Baxter
57. Mispac Resources Inc.
58. Cuvier Mines Inc.
59. Brunex Gold Resources Limited
60. Stratabound Minerals Corp.
61. J.A. Roy McIntyre
62. Barbara Durling
63. Little River Coal Company Ltd.



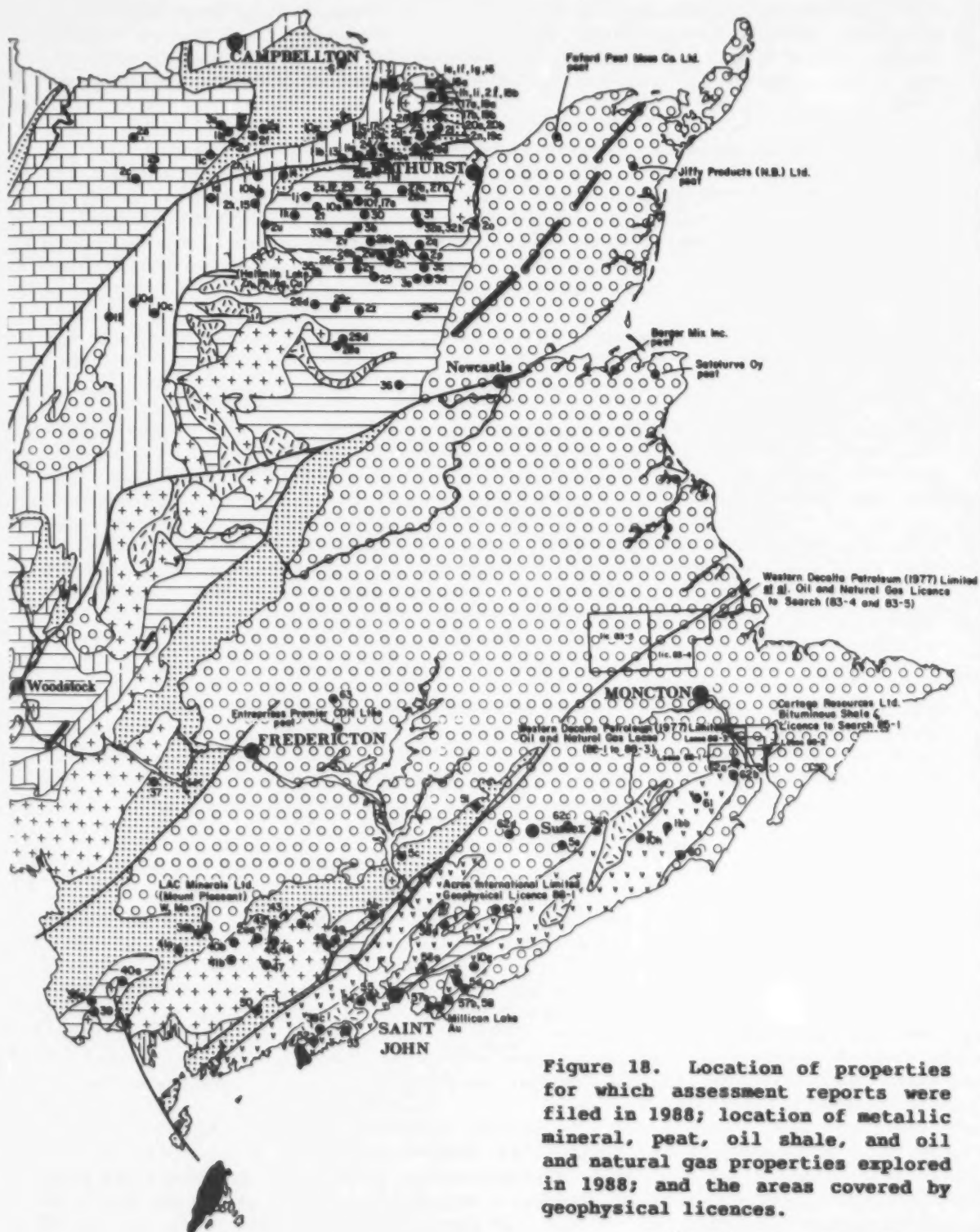


Figure 18. Location of properties for which assessment reports were filed in 1988; location of metallic mineral, peat, oil shale, and oil and natural gas properties explored in 1988; and the areas covered by geophysical licences.

Other companies that worked in northern New Brunswick include Northeast Exploration Services Limited, Lone Pine Exploration Ltd., Heron Mines Limited, Tri Exploration Ltd., Sharpe Energy and Resources Limited, Four Seasons Resources Limited, Shamrock Resources Inc., and Gordex Minerals Limited.

Gold exploration remained active in the Caledonia Zone along the Bay of Fundy coast (Figure 18), where several gold deposits and occurrences are associated with major thrust faults. Platinum and palladium interest was concentrated in areas underlain by mafic-ultramafic intrusions in this area. Companies working in the Caledonia Zone include Brunex Gold Resources Limited, Cuvier Mines Inc., Gordex Minerals Limited, Great Horn Mining, Inc., International Corona Resources Ltd., Lombard Consolidated Resources Inc., Maritime Resource Research Ltd., Mispec Resources Inc., Newbrun Resources Ltd., PGE Resource Corp., Stratabound Minerals Corp., and Northeast Exploration Services Limited. Several prospectors also were active in the area.

Exploration for gold was greatly accelerated in the Magaguadavic-St. Croix Zone during 1988, particularly along its southern margin in the Annidale-Nerepis belt. Companies that reported on their work in this zone included Brunswick Mining and Smelting Corporation Limited, Cobrun Mining Corp., Goldfluor Exploration Limited, Grand Empire Exploration Limited, and Maritime Resource Research Limited. Several major companies that worked in this area during 1988 had not yet reported on their work at the time of writing this report. In addition to various companies, several prospectors actively explored their claims in this zone.

EDITOR'S NOTE: The first name (company or individual) given for each assessment report is that of the holder of the mining rights. Since the author of the report may not be the holder of the rights, please consult the Geoscan index for cross-reference information.

MATAPEDIA - AROOSTOOK ZONE

1. Northeast Exploration Services Limited

(a) POPELOGAN EAST Claim Gp. (473590)

21 O/10E

Confidential until December 6, 1990. This group of 12 claims is at the headwaters of Little Popelogan Brook, north of Southwest Upsalquitch River. A geochemical survey was carried out in which 32 stream sediment, 9 till, and 13 heavy-mineral samples were collected and analysed for 28 elements plus gold.

(b) POPELOGAN RIVER Claim Gp. (473564)

21 O/10E

This 12-claim group is approximately 75 km west of Bathurst and 5 km north of Upsalquitch Forks. The east side of the property is underlain by Matapedia Group limestone whereas the west side is mainly underlain by a

felsic intrusion. Twenty C-horizon till samples were collected on and north of the property in an attempt to validate a 112 ppb Au-in-till anomaly reported by the Geological Surveys Branch. No anomalous values were obtained but the original site, near the middle of the claim group, was not sampled.

(c) UPSALQUITCH Claim Gp. (473565)

21 O/10W

The Upsalquitch group of 12 claims is about 80 km west of Bathurst and 5 km west of Upsalquitch Forks. The property is underlain by sedimentary rocks of the Silurian Upsalquitch Formation. Fourteen till samples were collected on and near the property in an attempt to validate a 322 ppm gold-in-till anomaly reported by the Geological Surveys Branch. No anomalous values were obtained but the original sample site, near the middle of the claim group, was not found.

2. Brunswick Mining and Smelting Corporation Limited

(a) RITCHIE BROOK Claim Gp. (473493)

21 O/11E

Confidential until April 4, 1990. This group of 12 claims is 18 km east of the village of Kedgwick. Work on this property consisted of line-cutting (15 km), proton magnetometer and VLF EM-16 geophysical surveys, and a soil sampling survey. The 615 B-horizon samples were collected and analysed for Cu, Pb, Zn, As, Ag, Au and Sb.

(b) 27-MILE BROOK Claim Gp. (473526)

21 O/11E

Confidential until July 24, 1990. This 19-claim group is 21 km east of Kedgwick, northwestern New Brunswick. An 11.4 km grid was established and a geological compilation of previous work was completed.

(c) 30-MILE BROOK Claim Gp. (473511)

21 O/11E

Confidential until June 6, 1990. This group of 25 claims is located about 20 km east-southeast of the village of Kedgwick. A 13.9 km grid was cut on the property and VLF EM and magnetometer surveys were carried out, as were general prospecting and geological mapping. A geochemical survey consisted of collection and analysis of 645 B-horizon soil samples for Cu, Pb, Zn, As, Ag, Au, and Sb content, and 13 rock samples for Cu, Pb, Zn, As, Ag, and Au.

(d) NIGADOO RIVER Claim Gp. (473536)

21 P/12W

Confidential until August 16, 1990. The Nigadoo River group of 141 claims is a few kilometres west of Alcida. Nigadoo River flows through the property. A 59.7 km grid was established and VLF EM-16 and magnetometer surveys were carried out. The area covered by the grid was mapped and sampled (2304 B-horizon soil samples). Of these, 2292 samples were analysed for Pb, Zn, Cu, Ag, As, Sb, and Au. Seven trenches were dug, sampled and backfilled.

3. Norman Pitre

(a) GORDON BROOK Claim Gp. (473592)

21 O/10E

This 12-claim block is about 80 km west of Bathurst and 5 km north of Upsalquitch Forks. Most of the property is underlain by sedimentary rocks of the Silurian Upsalquitch Formation but the northeast corner is underlain by an early Devonian felsic intrusion. Work consisted of a geochemical

survey (277 soil samples analysed for Zn, Ag and As). There were few anomalous samples; the maximum values obtained were 456 ppm Zn, 1.3 ppm Ag and 75 ppm As.

4. A. Wayne Lockhart

WINDSOR Property, M.L. 1313 (473507)

21 J/6W

The Windsor property covers a limestone deposit immediately east of the Settlement of Windsor, about 14 km northeast of Hartland in western New Brunswick. A channel sample about 7 m long was collected from the south face of an old limestone pit. The sample was divided into two 3.5 m long adjoining sections. Chemical analyses of these samples showed that they contained, respectively, 54.3% and 64.7% CaO and 0.315% and 0.280% MgO with small amounts of SiO₂, Fe₂O₃ and Al₂O₃. A Los Angeles abrasion test on a bulk sample of this material showed an abrasion loss of 28.8%, which suggests that the limestone is suitable for a variety of construction purposes.

5. Maritime Resource Research Ltd.

(a) WOODSTOCK Mn Claim Gp. (473540)

21 J/4E

Confidential until August 29, 1990. This 57-claim group is along the northwestern boundary of the Town of Woodstock in western New Brunswick. The area is underlain by calcareous slate, siltstone and limestone of the Ordovician-Silurian Matapedia Group. An extensive manganese deposit is hosted by these rocks. About 700 m of diamond drilling and 180 m of trenching was carried out on the property to define this deposit. Grade and tonnage calculations were completed and thin sections were prepared to study the mineralogy of the deposit.

TOBIQUE - CHALEUR ZONE

1. Northeast Exploration Services Limited

(d) JERRY BROOK Claim Gp. (473566)

21 O/10W

The Jerry Brook group (12 claims) is about 85 km west of Bathurst and 5 km west of McCormack Lake. The property is underlain by sedimentary rocks of the Devonian Dalhousie Group. Nineteen till samples were collected outside the claim group in an attempt to validate a 210 ppb gold-in-till anomaly reported by the Geological Surveys Branch. No anomalous values were found, but the original sample site was near the middle of the claim group.

2. Brunswick Mining and Smelting Corporation Limited

(e) LEVESQUE GULCH Claim Gp. (473530)

21 O/10E

Confidential until August 1, 1990. These six claim groups (totaling 116 claims) include Levesque Gulch, Levesque Gulch Extension (3), Southeast Falls, and Upsalquitch Forks groups. Four trenches totalling 250 m in length were dug and the geology was mapped. A total of 541 till, silt, and stream-sediment samples were collected and analysed for Au and Sb.

(f) PENTAMEROUS Claim Gp. (473602)

21 O/10E

Confidential until December 22, 1990. General prospecting and geological mapping were carried out on this claim group, which is located about 8 km due east of Upsalquitch Forks, Restigouche County. A total of 247 stream silt, heavy-mineral concentrate, soil, and till samples were collected.

(g) MT. AKROYD Claim Gp. (473601)

21 O/10E

Confidential until December 22, 1990. This group of 44 contiguous claims is east of the Dalhousie Road, 30 km west of Bathurst. In addition to geological mapping and general prospecting, 261 stream silt, heavy-mineral concentrate, soil, and till samples were collected.

(h) CARROLL Claim Gp. (473561)

21 O/10E

The Carroll group (6 claims) is located about 52 km west of Bathurst and is underlain by sedimentary rocks of the Silurian Chaleurs Group. The northeasterly trending McCormack Brook Fault cuts through the centre of the property. Work consisted of a soil geochemical survey for Cu, As and Au; VLF and magnetometer surveys; trenching; and lithologic mapping. Most of the trenching was done in the southern part of the property where there are weak Au-As-Cu soil anomalies that are more or less coincident with a silicified limestone. Values up to 7200 ppb Au were found in gossanous regolith but fresh rock did not yield values this high. Therefore, the anomalous gold has been attributed to supergene enrichment.

(i) JONPOL Claim Gp. (473597)

21 O/10E

Confidential until December 15, 1990. This group of 70 contiguous claims is 55 km west of Bathurst along the Dalhousie Road, north of Highway 180. Five trenches totalling about 500 m in length were dug and the geology mapped. Samples were collected and analysed.

(j) McCORMACK/RAMSAY BROOK Claim Gp. (473541)

21 O/10E

Confidential until August 29, 1990. This claim group consists of 679 contiguous claims, which are located approximately 120 km west of Bathurst. A 9.0 km grid was established and the claims were prospected and trenches were dug (41 totalling 2150 m in length). Geological mapping of the trenches was completed. VLF EM and proton magnetometer surveys were carried out, and 2788 soil and 1319 rock samples were collected and analysed for Au, As, and Cu.

(k) JONPOL Claim Gp. (473476)

21 O/10E

Confidential until March 2, 1990. This group of 70 contiguous claims is 55 km west of Bathurst. A 64 km grid was cut and flagged. Work on the property included geochemical (Au, As, Cu) and geophysical (proton magnetometer, VLF EM) surveys, and geological mapping. Six trenches were dug.

6. David Dupre

BENJAMIN RIVER Claim Gp. (473607)

21 O/16E

This block of 20 claims is about 60 km northwest of Bathurst and just east of South Branch Benjamin River. The property is underlain by Silurian mafic volcanic rocks that are intruded by early Devonian granite and granodiorite. Work consisted of a compilation of previous assessment data,

grid establishment, a magnetometer survey, geological mapping, trenching, and lithogeochemistry (78 samples). The samples were analysed for 20 elements (by ICP) including yttrium (Y), lanthanum (La), cerium (Ce) and phosphorous (P). These elements are contained in apatite that occurs in steeply dipping veins striking at 60° and 110°. The apatite veins commonly contain magnetite or are associated with magnetite veins. The veins occur in an alteration zone that is localized along the contact between granitic and volcanic rocks. Assays up to 1345 ppm Y, 645 ppm La, 1813 ppm Ce and 9.56% P₂O₅ are reported.

7. Four Seasons Resources Limited and Fred Cady

HICKEY Claim Gp. (473505)

21 P/13W

The Hickey group (30 claims) is 30 km northwest of Bathurst and 6 km north of Antinouri Lake. The northern part of the property is underlain by mafic volcanics of the Dalhousie Group, whereas the southern part is underlain by sedimentary rocks that probably belong to the Ordovician Elmtree Group. Work consisted of grid establishment; magnetometer, VLF, and IP surveys; a soil geochemical survey (89 samples); and general prospecting. The soil samples were analysed by multi-element ICP, but only Cu, Pb, Zn, Sb, Bi, As, and Au are reported. Geochemically anomalous Sb, Bi, and As are restricted to the vicinity of the previously excavated trenches where there is a known gold showing (3.43 g/t).

8. Owen Hickey

McGREGOR Claim Gp. (473567)

21 O/16E

This 4-claim group is situated approximately 33 km northwest of Bathurst and 5 km south of the village of Jacquet River. The property is underlain by volcanic and sedimentary rocks of the Devonian Dalhousie Group. Work consisted of prospecting, trenching and lithogeochemistry (5 samples). The best assay is 69 ppb Au, 25 ppm As, and 5.5 ppm Sb.

9. Thomas Jamieson

(a) THE SHEDS Claim Gp. (473521)

21 O/9E

This 2-claim block is about 45 km northwest of Bathurst and 25 km south-southwest of the village of Jacquet River. The property is underlain by mafic and felsic volcanic rocks of the Devonian Dalhousie Group, and is situated in the geochemically anomalous part of the Jacquet River volcanic belt. Work consisted of a soil geochemical survey (15 samples) for Cu, Pb, Zn and As. The highest values obtained are 55 ppm Cu, 64 ppm Pb, 160 ppm Zn, and 18 ppm As.

10. Lacana Mining Corporation Limited

(a) ROCKY BROOK Claim Gp. (473560)

21 O/9E

Confidential until August 18, 1990. This group of 9 claims is approximately 70 km west-northwest of Bathurst and 45 km south of Dalhousie on the headwaters of Jacquet River. A grid was established and 1200 B-horizon samples were collected and analysed for Au, Ag, Sb, As, and Hg. VLF EM-16 and proton magnetometer surveys were carried out, five trenches (125 m in length) were dug, and the geology was mapped.

(b) SIMPSONS BROOK Claim Gp. (473508)

21 O/10E

This 20-claim block is 70 km west-southwest of Bathurst along Hwy. 180 (Road to Resouces). The property straddles the boundary (faulted?) between Lower Devonian mafic volcanics and probable Upper Silurian sedimentary rocks. Work consisted of grid establishment, prospecting, and soil (471 samples), silt (12 samples) and rock (22 samples) geochemical surveys. The samples were analysed for 30 elements plus gold. The soils in an easterly trending zone along the upper tributaries of Simpsons Brook are anomalous in Cu (up to 833 ppm), Pb (up to 200 ppm) Zn (up to 1943 ppm), Sb (up to 31 ppm), As (up to 394 ppm), and Au (up to 35 ppb). Boulders of silicified breccia are associated with this zone and probably reflect a fault that was hitherto unsuspected. Further work is recommended.

(c) NEARY POND Claim Gp. (473583)

21 O/3E

Confidential until November 29, 1990. This group of 16 claims is located northeast of Riley Lake and 2 km east of the community of Rocky Brook. Forty samples were collected and analysed for Au, Pb, and As. The stream-sediment samples were analysed for 17 elements.

(d) TOBIQUE RIVER Claim Gp. (473584)

21 O/3E

Confidential until November 29, 1990. This group of 16 claims is 120 km southwest of Bathurst. The western edge of the property is 2 km east of Nictau. Twenty-eight stream-sediment and heavy-mineral samples were collected and analysed for Cu, Pb, Zn, As, Au, and Sb.

11. Caribou New Brunswick Mining Limited

(a) ORVAN BROOK Property, M.L. 1213 (473470)

21 O/9E

Confidential until February 17, 1990. This property is about 32 km west of Bathurst and about 3 km south-southwest of Lower Tetagouche Lake. A 9.6 km grid was flagged and 233 B-horizon soil samples were collected and analysed for 28 elements.

(b) McMASTER Property, M.L. 1037 (473468)

21 O/9E

Confidential until February 17, 1990. The McMaster property is approximately 72 km west of Bathurst and 3 km south of Upper Tetagouche Lake. An 11.2 km grid was flagged and 309 soil samples were collected and analysed for 28 elements.

13. Seabright Resources Inc.

TETAGOUCHE LAKES Claim Gp. (473458)

21 O/9E

The Tetagouche Lakes group (112 claims) is approximately 50 km west of Bathurst and just south of Middle Tetagouche Lake. Three quarters of the property is underlain by rocks of the Ordovician Tetagouche Group; the northeastern quarter is underlain by the Carboniferous Bathurst Formation. Previous work was synthesized; 28 till samples were collected and analysed for Cu, Pb, Zn, Ag, Sb, As, and Au; and 11 rock samples were collected and assayed for Au. One rock sample yielded 0.34 g/t Au.

14. Kenneth D.A. Whaley

MURRAY BROOK Claim Gp. (473459)

21 O/9W

This 11-claim block is about 60 km west of Bathurst and 3 km south-

west of Murray Lake. The property is underlain by fine-grained sedimentary rocks of the Silurian Chaleurs Group. Work consisted of grid establishment, till sampling (6 samples), trenching (total length 168 m) and a lithogeochemical survey (54 channel and 10 grab samples). Two zones of anomalous zinc mineralization (303 ppm over 16 m and 560 ppm over 2 m) were found but no anomalous gold zones were discovered. Geophysical surveys are recommended.

15. Peter Jamieson

ROAD TO RESOURCES Claim Gp. (473595)

21 O/10E

This 6-claim block is about 70 km west-southwest of Bathurst and 1.5 km north of Third Portage Lake. The property is underlain by highly altered Silurian sedimentary rocks and Lower Devonian gabbro. Work consisted of a single drill hole (152.4 m) and lithogeochemical sampling (14 samples) of the core. The samples were analysed for As, Sb, Ag, and Au with the highest values being 145 ppm As, 7.5 ppm Sb, and 3.09 g/t Ag. Gold was not detected.

ELMTREE ZONE

1. Northeast Exploration Services Limited

(e) BELLEDUNE Claim Gp. (473472, 473473)

21 P/13W

This 7-claim group is about 30 km north-northwest of Bathurst and 4 km south of Belledune. The property is underlain by mafic rocks of the Ordovician Fournier Group. Work consisted of overburden (Pyonjar) drilling (28 samples) and geochemical analysis for 28 elements. Values up to 3784 ppm Pb, 1037 ppm Zn, 104 ppm Cu, 312 ppm As and 2.2 ppm Ag were obtained. More work is planned.

(f) ELMTREE Claim Gp. (473474)

21 P/13W

This 7-claim group is about 25 km northwest of Bathurst and 10 km south of Belledune. The property is underlain by sedimentary rocks of the Ordovician Elmtree Group. Work consisted of an overburden drilling programme to sample the bedrock-till interface at localities where soil-geochemical anomalies previously had been found. Nine samples were collected and analysed for 28 elements (by ICP); all were weakly anomalous in base metals and arsenic.

(g) LAKE BROOK Claim Gp. (473588)

21 P/13W

Confidential until December 6, 1990. The Lake Brook group (12 claims) is about 4 km east of Mitchell Settlement and about 30 km northwest of Bathurst. A total of 23 stream-sediment and heavy-mineral-concentrate samples were collected and analysed for 28 elements plus gold.

(h) ELMTREE WEST Claim Gp. (473570)

21 P/13W

This group of 7 claims is located approximately 3 km west of Madran and 25 km northwest of Bathurst. Forty-three B-horizon soil samples were collected and analysed for Pb, Zn, As, and Au.

(i) GUITARD BROOK Claim Gp. (473532)

21 P/13W

This 9-claim block is about 28 km north-northwest of Bathurst and 5 km south of Belledune. The property is underlain by mafic igneous rocks of the Ordovician Elmtree Group. Work consisted of preliminary prospecting and lithogeochemical sampling (15 samples). The highest assay reported from one of the grab samples is 79.89 g/t Ag and 1.44 g/t Au.

2. Brunswick Mining and Smelting Corporation Limited

(1) HICKEY-CADY Property, M.L. 1385, 1390 (473489)

21 P/13W

This property, which comprises two contiguous mining licences (1385 and 1390) and 9 mining claims, is situated about 20 km northwest of Bathurst. The property is underlain by the Ordovician Elmtree Group. Work consisted of a soil geochemical survey for Cu, Pb, Zn, As, Sb, Ag, and Au; magnetometer and VLF EM surveys; trenching; and diamond drilling. All the trenches (7 totalling 400 m) and most of the drilling (6 holes totalling 623 m) were on the western part of the property. One hole tested the "Hickey gold showing" (8.02 g/t Au over 3 m) in the central part of the property but with negative results. The trenches and four of the drill holes tested coincident magnetic, VLF EM, and soil geochemical anomalies. The latter produced results of up to 26 000 ppm As, 34 ppm Sb, 2000 ppm Pb, 540 ppm Zn, and 6.8 ppm Ag. The highest Au analysis reported was 790 ppb, which came from trench Ho-T2-87.

(m) NIGADOO EXTENSION Claim Gp. (473492)

21 P/12W

Confidential until March 30, 1990. The Nigadoo group (9 claims) is 3 km west of the community of Free Grant. A total of 70 till heavy-mineral-concentrate samples were collected and analysed for gold.

(n) MILLSTREAM GOLD Claim Gp. (473480)

21 P/12W

Confidential until March 15, 1990. This 43-claim group is 14 km northwest of Bathurst between Nicholas Dénys and Sormany. Linecutting (23.15 km), geological mapping, and grab sampling were carried out. A total of 2105 B-horizon samples were collected and analysed for Cu, Pb, Zn, Ag, As, Sb, and Au. Geophysical surveys (VLF EM and magnetometer) and diamond drilling (one 200.9 m hole) were completed.

11. Caribou New Brunswick Mining Limited

(c) ROCKY TURN Property, M.L. 1029 (473469)

21 O/9E

Confidential until February 17, 1990. The Rocky Turn property is about 30 km west of Bathurst and 2 km east of Lower Tetagouche Lake. A 9.6 km grid was established and 241 B-horizon soil samples were collected and analysed for 28 elements.

16. Fred Cady

BELLEDUNE Claim Gp. (473503)

21 P/13W

This 9-claim block is about 25 km north-northwest of Bathurst and 6 km south of Belledune. The property is underlain by mafic volcanic rocks of the Ordovician Fournier Group. The claims were prospected and trenches were hand dug. Anomalous Au and Ag, respectively up to 226 ppb and 344.57 g/t, were found in quartz-sulphide veins and breccia zones that cross-cut the mafic volcanics. The Bouguer gravity map (Plate 78-42h)

indicates that these veins are probably genetically related to an underlying granitic intrusion, i.e., part of the Antinouri Lake pluton.

17. Merton Stewart

(a) SOUTH FOURNIER BROOK Claim Gp. (473534)

21 P/13W

This 53-claim group is 5 km west of Pointe Verte and 7 km south of the Belledune Smelter in northern New Brunswick. Angular mineralized float was found on the property. A grid was established and 873 soil samples were collected and analysed for As, Pb, Zn, and Ag. Pb-Zn-As soil anomalies and a VLF EM conductor were delineated in the area of the mineralized float.

(b) STE. ROSETTE Claim Gp. (473516)

21 P/12W

The Ste. Rosette group (50 claims) is about 18 km northwest of Bathurst and just west of the old Nigadoo mine. The property is underlain by sedimentary rocks of the Silurian Chaleurs Group. Two grids were established on the property; one in the northwestern part with a base line trending east-west (true) and the other in the southeastern part with a base line trending east-west (magnetic). Silt- and soil-geochemical surveys were conducted on the south grid and the samples were analysed for As, Ag, and Au. A significant As anomaly (values up to 2768 ppm) crosses the northern part of this grid in an easterly direction. The north grid was soil-sampled (Pb, Zn, Ag) and tested by magnetometer, VLF EM, and IP surveys. Easterly trending soil-geochemical, VLF EM, and IP anomalies were found in the north-central part of the grid. Drilling was recommended.

(c) MILLSTREAM WEST Claim Gp. (473506)

21 O/9E

This 72-claim group is 30 km west of Bathurst between Millstream Lake and Tetagouche River. The southern third of the property (south of the Rocky Brook-Millstream Fault) is underlain by Tetagouche Group rocks; the northern two-thirds by sedimentary rocks of the Silurian Chaleurs Group. Lower Devonian mafic dykes intrude these units. Sixteen holes (totalling 2780.7 m) were drilled in the extreme east-central part of the property to test quartz-ankerite veins along the margins of a mafic dyke. A number of short intersections (0.3-3.0 m) with disseminated pyrite-arsenopyrite were encountered that graded between 0.68 g/t and 10.97 g/t Au. Further work was recommended.

(d) MILLSTREAM EAST AND EXTENSION Claim Gp. (473502)

21 P/12W

This 67-claim group is about 15 km west-northwest of Bathurst along the Sormany Road. The property is underlain by Ordovician mafic volcanic and sedimentary rocks (Tetagouche Group) that are cut by mafic dykes of probable Lower Devonian age. Four holes (totalling 720.5 m) were drilled in the north-eastern part of the property near the Rocky Brook-Millstream Fault to test soil-geochemical and/or IP anomalies found the previous year. The best assay was 0.34 g/t Au and 72.0 g/t Ag over 0.9 m (hole H-17), but reference is made to stratiform base-metal mineralization in the interval 100 to 113 m. More drilling is recommended to test the base-metal potential of the property.

18. Aurtex Incorporated

(a) PRAIRIE BROOK Claim Gp. (473568)

21 P/13W

The Prairie Brook group of 4 claims is 25 km north-northwest of Bathurst and is contiguous with the Elmtree River claim group. Preliminary prospecting and mapping were conducted.

(b) ELMTREE RIVER Claim Gp. (473569)

21 P/13W

This 12-claim block is located approximately 26 km north-northwest of Bathurst and 3 km west of Madran. The property is underlain by sedimentary rocks of the Ordovician Elmtree Group. Work consisted of preliminary prospecting and reconnaissance geological mapping.

19. Acadia Mineral Ventures Limited

(a) KEYMET-MADRAN Claim Gp. (473548)

21 P/13W

This 59-claim block is about 22 km northwest of Bathurst and is underlain by the Ordovician Elmtree Group. Magnetometer, VLF EM and soil-geochemical surveys were conducted. The soils were analysed by ICP method and fire-assayed for gold. However, only Pb, Zn, As, and Au values are reported. Several Au-As soil anomalies were detected and more work was recommended.

(b) ROBERTVILLE Claim Gp. (473539)

21 P/12W

This 30-claim property, 14.4 km northwest of Bathurst, straddles the boundary between the Silurian Chaleurs Group and the Ordovician Tetagouche Group. Six holes (totalling 1008.3 m) were drilled on the property to test soil-geochemical and VLF EM anomalies. No gold-bearing zones were intersected.

(c) NORTH GRANTS BROOK-SORMANY Claim Gp. (473510)

21 P/12W

This block of 48 claims is approximately 12 km west-northwest of Bathurst and is underlain by the Ordovician Tetagouche Group, which is intruded by northeast-trending mafic dykes. A soil-geochemical survey was conducted for As, Pb, and Zn; there are some anomalous values and more work was recommended.

(d) FREE GRANT Claim Gp. (473547)

21 P/12W

This 59-claim property, which is situated 19.2 km northwest of Bathurst, is underlain by the Silurian Chaleurs Group, and is not far northeast of the Nicholas Dénys Granite. A soil-geochemical survey (1573 samples) for Pb, Zn, and Ag was conducted on a flagged grid. Magnetometer, VLF EM, and IP surveys were also completed. Ten holes (totalling 1782.8 m) were drilled to test various geochemical and geophysical targets. The best intersection was 12.08% Pb, 5.92% Zn, and 126.9 g/t Ag over 0.38 m.

(e) MILLSTREAM Claim Gp. (473605)

21 P/12, 21 O/9

This 154-claim group is about 19.2 km west-northwest of Bathurst. Most of the property is underlain by the Silurian Chaleurs Group but the southern part, south of the Rocky Brook-Millstream Fault, is underlain by the Ordovician Tetagouche Group. Both groups are cut by mafic dykes that have easterly to northeasterly trends.

Work consisted of a soil-geochemical survey (4578 samples) for Cu, Pb, Zn, As, Ag, and Au; magnetometer and VLF surveys; prospecting; and diamond drilling (29 holes totalling 5690 m). Gold, which was found at three locations on the property, is associated with illitized and silicified alteration zones and stockwork quartz-carbonate veins that are in or along the margins of mafic dykes. The gold occurs as electrum contained in sulphides (predominantly pyrite and acicular arsenopyrite) within the veins and disseminated through the alteration zones. The highest assays from

drill core were in hole SM-88-17, i.e., 26.40 g/t Au over 0.15 m and 34.05 g/t Au over 0.11 m.

(f) MILLSTREAM WEST (10) Claim Gp. (473606)

21 O/9E

This 10-claim group is approximately 25 km west-north-west of Bathurst and is contiguous with the northwestern part of the Millstream claim group (473605). This property was subjected to the same exploration surveys as its neighbours with one exception - a single trench was dug on this property but no trenching was done on the Millstream claim group. The trench exposed a mafic dyke and gold mineralization that had been intersected by two drill holes (out of sixteen) last year. Another nine holes (totalling 1395 m) were drilled in 1988. Subeconomic gold mineralization was found along the contacts of three mafic dykes; individual samples assayed up to 24.34 g/t Au but the best intersection was 3.91 g/t over 6.3 m.

(g) TETAGOUCHE-MILLSTREAM Claim Gp. (473551)

21 O/9E

Confidential until September 22, 1990. This group of 285 claims straddles the Restigouche-Gloucester County line, 30 km due west of Bathurst. A total of 134 km of line was cut. An induced polarization survey was completed and soil samples were collected and analysed for Pb, Zn, As, Cu, Ag, and Au.

20. Shamrock Resources Inc.

(a) NIGADOO MINE Claim Gp. (473461)

21 P/12W

Confidential until February 9, 1990. The Nigadoo mine group (12 claims) is 25 km northwest of Bathurst. Nigadoo River runs through the property. VLF EM-16 and proton magnetometer surveys were carried out, and 209 B-horizon soil samples were collected and analysed for 28 elements.

(b) NIGADOO MINE Property, Lease 239 (473462)

21 P/12W

Confidential until February 9, 1990. This property is 25 km north-west of Bathurst. A 45 km grid was established and geological mapping, trenching (5 holes totalling 475 m), and geophysical surveys (VLF EM, proton magnetometer) were completed. A total of 1186 B-horizon soil samples were collected and analysed for 28 elements.

21. Michael Smith and A. Ben Baldwin

SMITH Claim Gp. (473572)

21 P/12W

This 32-claim group is approximately 15 km northwest of Bathurst and about 2 km south of the old Nigadoo mine site. The property straddles the Rocky Brook-Millstream Fault but sedimentary rocks of the Silurian Chaleurs Group occur on both sides of the fault. Nine holes (totalling 1432 m) were drilled to test soil-geochemical and VLF EM anomalies. One hole (H-4) had several 0.6-1.5 m intersections that were anomalous in gold (up to 1.30 g/t) but the other holes had no significant intersections.

22. Michael McCombe, Sr.

McMILLAN SETTLEMENT Claim Gp. (473481)

21 O/16E

This 40-claim block is approximately 35 km northwest of Bathurst along the east side of Jacquet River. The property is underlain by volcanic

rocks of the Lower Devonian Dalhousie Group. A northerly trending fault zone containing barite, quartz, and copper sulphides had been found in the past but the gold potential of the property had not been thoroughly investigated. Work consisted of a magnetometer survey to help delineate other favourable structures.

23. Acadia Mineral Ventures Limited and Norman Pitre

NICHOLAS DÉNYS Claim Group (473562)

21 P/12W

This 21-claim group is situated about 19 km northwest of Bathurst and includes the "Zarina gold prospect." The property is underlain by the Silurian Chaleurs Group and is just west of the Devonian Nicholas Dénys Granite. Fifteen holes (totalling 2112 m) were drilled on the property to test gold-bearing quartz-sulphide veins outlined previously. The best assay reported was 13.2 g/t Au over 1.5 m.

24. Sharpe Energy and Resources Limited

LOWER TETAGOUCHE LAKE Claim Gp. (473478)

21 O/9E

This 30-claim group is situated 35 km west of Bathurst at the eastern end of Lower Tetagouche Lake. The property straddles the Rocky Brook-Millstream Fault. To the south of this fault are volcanic and sedimentary rocks of the Ordovician Tetagouche Group; to the north are sedimentary rocks of the Silurian Chaleurs Group. Four trenches (total length 200 m) were dug on the western part of the claim group to test soil-geochemical and geophysical anomalies that had been found the previous year south of the fault. Twenty-six rock/chip samples were collected from the trenches and analysed for Ag and Au but no anomalous values were obtained.

MIRAMICHI ZONE

1. Northeast Exploration Services Limited

(j) FORTY-FOUR MILE BROOK (473554) and
CAMEL BACK MTN. (473555) Claim Gps.

21 O/9W

These 16- and 15-claim blocks, respectively, are about 50 km west of Bathurst, 4 km south of the Caribou mine, and 2 km apart. The properties are underlain by felsic volcanic rocks of the Ordovician Tetagouche Group. Seventeen stream-silt and seven heavy-mineral-concentrate samples were collected over parts of the two properties and between them. The samples were analysed for 27 elements by ICP and for gold by fire assay. No significant anomalies were found.

(k) TOWER Claim Gp. (473497)

21 O/8W

The Tower group (9 claims) is approximately 60 km west-southwest of Bathurst and 1 km northwest of the Upsalquitch TV tower. The property is underlain by felsic volcanic rocks of the Tetagouche Group. A gravity survey was conducted but the result were erratic; more work was recommended to check these gravity data.

(1) ROCKY BROOK Claim Gp. (473589)

21 O/3E

Confidential until December 6, 1990. This group of 16 claims is approximately 4 km north of the community of Rocky Brook and about 140 km southwest of Bathurst. A total of 18 stream-sediment and heavy-mineral-concentrate samples were collected and analysed for 28 elements.

2. Brunswick Mining and Smelting Corporation Limited

(o) COLD BROOK Claim Gp. (473587)

21 P/5E

This group of 132 claims is approximately 20 km south of Bathurst and partly surrounds the Key Anacon mining licence (1287). The work reported covers about 4 claims that are north of the mining licence along Nepisiguit River. Magnetometer, VLF EM, and Max-Min surveys were conducted and three holes (totalling 436.17 m) were drilled to test three geophysical targets. "Brunswick-type" stratigraphy was found but only minor amounts of sulphides were intersected.

(p) N.B.E. Claim Gp. (473463)

21 P/5W

Confidential until February 9, 1990. This 11-claim group is 48 km from Bathurst. The claims are approximately 250 m east of Nepisiguit Brook on the Taylor Brook Road. A 16.86 km grid was cut and Max-Min II and proton magnetometer surveys were conducted. A total of 640 C-horizon soil samples were collected and analysed for Cu, Pb, Zn, As, Ag, and Au.

(q) NEPISIGUIT BROOK Property, M.L. 1376 (473465)

21 P/5W

Confidential until February 9, 1990. This property is 48 km from Bathurst. The claims are approximately 250 m east of Nepisiguit Brook on the Taylor Brook Road. A 4.73 km grid was cut and Max-Min II and proton magnetometer surveys were conducted. A total of 179 C-horizon soil samples were collected and analysed for Cu, Pb, Zn, As, Ag, and Au.

(r) CARIBOU ROAD Claim Gp. (473527)

21 O/9E

This 147-claim group is about 30 km west-southwest of Bathurst and 5 km north-northeast of California Lake. The property straddles a north-northeasterly trending sedimentary band with mafic volcanic rocks to the east and felsic volcanic rocks to the west; all are part of the Ordovician Tetagouche Group. Work consisted of a soil geochemical survey (4685 samples) for Cu, Pb, Zn, As, and Ag; magnetometer and Max-Min I survey; geological mapping; and local follow-up gravity surveys. Some weak geochemical anomalies were found but most do not have coincident geophysical anomalies. Further work was recommended in two areas where there were coincident anomalies.

(s) WOODSIDE BROOK Claim Gp. (473559)

21 O/9E

The Woodside Brook group of 84 claims is approximately 48 km west-southwest of Bathurst and 7 km southeast of the Caribou mine. The property is underlain by felsic volcanic rocks of the Ordovician Tetagouche Group. Work consisted of a soil geochemical survey (2324 samples) for Cu, Pb, Zn, As, Ag, Sb, and Au. Anomalous base-metal values were obtained from the north-central part of the property, and there are two areas with anomalous As and Sb. Au values are generally below detection limit but there is one 460 ppb value. More work was planned.

(t) FORTY-FOUR MILE BROOK Claim Gp. (473509)

21 O/8W

Confidential until June 6, 1990. This group of 30 claims is located 52 km southwest of Bathurst in the northern corner of Northumberland County. Two trenches were excavated to a total length of 100 m. Prospecting and geological mapping were carried out.

(u) POPPLE DEPOT Claim Gp. (473453)

21 O/7E

Confidential until January 12, 1990. This group of 40 contiguous claims is approximately 3 km north of Nepisiguit River, 70 km west of Bathurst. Sixty-five till and stream-sediment samples were collected and analysed for gold.

(v) WEST WEDGE Claim Gp. (473580)

21 O/8E

Confidential until November 28, 1990. This block of 49 claims is approximately 6 km west-northwest of the abandoned Wedge mine. A total of 151 overburden samples were collected and analysed for Pb, Zn, Cu, Ag, Au, As, and Sb.

(w) McCORMACK LAKE EAST Claim Gp. (473598)

21 O/8E

Confidential until December 15, 1990. The McCormack Lake East group (8 claims) lies immediately west of Tomogonops Lake. A 12.5 km grid was cut and 441 B-horizon soil samples were collected and analysed for Cu, Pb, Zn, Ag, Au, and As. Horizontal-loop EM, VLF EM-16, and proton magnetometer surveys were completed.

(x) HEATH EAST Claim Gp. (473504)

21 O/8E

Confidential until May 10, 1990. This 152-claim group is east of the Heath Steele mine lease, approximately 50 km southwest of Bathurst. A 28.4 km grid was established. VLF EM, proton magnetometer, and HLEM surveys were completed. The area was prospected and 1045 B-horizon soil samples were collected and analysed for Cu, Pb, Zn, As, Ag, and Au.

(y) McCORMACK LAKE WEST Claim Gp. (473593)

21 O/8E

Confidential until December 8, 1990. This 24-claim group is approximately 6 km northwest of Heath Steele. A 38 km grid was cut and 1184 B-horizon soil samples were collected and analysed for Cu, Pb, Zn, Ag, and Au. Horizontal-loop EM, VLF EM-16, and proton magnetometer surveys were completed.

(z) MIRAMICHI Claim Gp. (473535)

21 O/1E

Confidential until August 15, 1990. This group of 38 contiguous claims lies immediately to the west of the Sevogle Airstrip. Three holes were drilled (total depth 300.53 m).

3. Norman Pitre

(b) WEST WEDGE Property, M.L. 1368 (473464)

21 O/8E

Confidential until February 9, 1990. This property is located about 6 km west-northwest of the abandoned Wedge mine. Prospecting and geological mapping were carried out. Proton magnetometer, VLF EM-16, and Max-Min II surveys were conducted. A total of 322 C-horizon soil samples were collected and analysed for Cu, Pb, Zn, Ag, Au, As, and Sb.

(c) CNE Claim Gp. (473600) 21 P/5W
Confidential until December 19, 1990. This group of 14 claims is 1.4 km north-northwest of the Captain sulphide deposit and 15 km east of the Heath Steele mine. Two holes were drilled to a total depth of 467.96 m.

(d) CAPTAIN Claim Gp. (473515) 21 P/5W
This 29-claim block is 38 km south-southwest of Bathurst and 14 km east of the Heath Steele mine. The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of a compilation of all previous work with recommendations for future explorations.

(e) RAILROAD Claim Gp. (473518) 21 P/5W
The 9-claim Railroad group is approximately 38 km south-southwest of Bathurst and 12 km east of Heath Steele. The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of a compilation of previous work and a limited amount of lithogeochemical sampling (11 samples) of existing drill core. The samples were analysed for 28 elements plus gold. One sample yielded more than 1000 ppm As and two yielded more than 1000 ppm Pb but no significant gold assays were obtained.

9. Thomas Jamieson

(b) TAYLOR BROOK Claim Gp. (473556) 21 O/8E
This property comprises 19 claims and Mining Licence 1296. It is approximately 8 km north-northeast of Heath Steele. The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group and has been periodically explored since base metals were found on the property by Consolidated Morrison in 1977. Two grids (east and west) were established and Max-Min surveys were conducted. An HEM anomaly was found on the west grid and follow-up trenching was recommended.

10. Lacana Mining Corporation Limited

(e) CALIFORNIA LAKE Claim Gp. (473571) 21 O/8E
Confidential until November 15, 1990. This group of 113 contiguous claims is located 40 km southwest of Bathurst. A drilling programme was carried out in two phases. Twenty-nine holes were drilled to a total depth of 3780 m.

(f) CALIFORNIA LAKE EAST Claim Gp. (473452) 21 O/8E
Confidential until January 12, 1990. This group of 53 claims is located north of California Lake, about 40 km southwest of Bathurst. A total of 960 soil samples were analysed for Zn, Ag, Au, and As and 926 were analysed for As, Ag, and Au.

11. Caribou New Brunswick Mining Limited

(d) ARMSTRONG A and B Property, M.L. 1017, 1100 21 O/9E
(473466, 473467)
Confidential until February 17, 1990. These properties are 30 km west of Bathurst. Work consisted of flagging a 9 km grid, and collection of 364 B-horizon soil samples. They were analysed for 28 elements.

12. Camille McLaughlin

McLAUGHLIN Claim Gp. (473496)

21 O/9E

This 2-claim group is located 2 km south of Woodside Brook near the intersection of the Northumberland, Gloucester, and Restigouche county boundaries. A 24.7 km grid was cut and 21 B-horizon soil samples were collected.

17. Merton Stewart

(e) CALIFORNIA LAKE EAST Claim Gp. (473471)

21 O/9E

This 130-claim block is about 38 km west-southwest of Bathurst and 3 km north of California Lake. The property is underlain by felsic and mafic volcanic rocks of the Ordovician Tetagouche Group. A grid (161 line kilometres) was established and VLF, magnetometer and soil-geochemical surveys were in progress.

25. Noranda Exploration Company, Limited

STRATMAT Claim Gp. (473544)

21 O/8E

Confidential until August 25, 1990. The Stratmat group of 56 claims adjoins the Heath Steele mine lease to the south. A 57 km grid was established, and mapping of underground workings and prospecting were carried out. Old trenches were filled in. A total of 4289 B-horizon soil samples were collected and analysed for Cu, Pb, Zn, Ag, Au, and As. Till, rock, and drill core samples were also analysed. Geophysical surveys include magnetometer, VLF EM-16, Max-Min I, and Pulse EM. A 770 m exploration decline was completed. Thirty-one holes were drilled totalling 11 402 m. Reserves were calculated.

26. Sevogle Exploration Inc.

(a) MIDDLE RIVER Claim Gp. (473594)

21 O/9E

Confidential until December 12, 1990. This 36-claim group is approximately 32 km west of Bathurst. Geological mapping and prospecting were carried out. Thirty till samples and 26 rock samples were collected and analysed for 33 elements plus gold.

(b) OTTER LAKE # 1 Claim Gp. (473576)

21 O/8E

Confidential until November 24, 1990. This group of 36 contiguous claims is located 9 km west-northwest of Heath Steele mine and approximately 2 km east of Grants and Otter lakes. A 15.9 km grid was established. Geological mapping, prospecting, VLF EM-16, magnetometer, and IP surveys were conducted. Four trenches were dug. Fifty-three rock samples were collected and analysed for Au plus 33 elements.

(c) OTTER LAKE # 2 Claim Gp. (473575)

21 O/8E

Confidential until November 24, 1990. This 9-claim group is located 9 km west-northwest of the Heath Steele mine and approximately 3 km southeast of Halfmile Lake. The area was prospected and 7 rock samples and 6 C-horizon till samples were collected and analysed for Au plus 33 elements.

(d) SLACKS LAKE Claim Gp. (473586)

21 O/1W

Confidential until December 4, 1990. This group of 219 claims is 25 km west-southwest of the Heath Steele mine. An IP survey and geological mapping were carried out. The area was prospected and 71 rock samples were collected and analysed for Au plus 33 elements. Ten trenches were excavated.

(e) LITTLE RIVER Claim Gp. (473525)

21 P/4W

This 9-claim block is 15 km southeast of the Heath Steele mine along Highway 430. The southeast side of the property is underlain by sedimentary rocks and the northwest side is underlain by mafic volcanic rocks. There is a silicified and tectonized zone separating the two sides that is highly anomalous in arsenic. Work consisted of geological mapping, prospecting, till geochemistry (87 samples), trenching and lithogeochemistry (16 samples). The till and rock samples were analysed for Au, Ag, As, Sb, Cu, Pb, Zn, Mo, W, and Hg. No anomalous values were detected in the till samples but several of the rock samples contain greater than 2000 ppm As, and two contain 125 ppb and 360 ppb Au. No further work was recommended on the property.

27. Wayne Carroll

(a) CARROLL Claim Gp. (473488)

21 P/12W

Confidential until March 29, 1990. This 8-claim group is 20 km southwest of Bathurst. The claims were prospected and 368 soil-geochemical samples were collected and analysed for 28 elements.

(b) DEN Claim Gp. (473585)

21 P/12W

Confidential until December 1, 1990. This group of 4 claims is 27 km southwest of Bathurst. The claims were prospected and 59 B-horizon soil samples were collected and analysed for Cu, Zn, As, Mo, Ag, Sb, Pb, Hg, and Au. A Beepmat survey was conducted.

28. Granges Exploration Ltd.

(a) MIDDLE RIVER Claim Gp. (473545)

21 P/12W

This 25-claim block is situated about 20 km west-southwest of Bathurst. The property is underlain by mafic volcanic and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of a soil-geochemical survey. Fifty-eight samples were analysed for Au by fire assay and for 28 elements by ICP. The highest Au and As analyses were 25 ppb and 118 ppm, respectively. No further work was recommended.

(b) ROGERS LAKE Claim Gp. (473577)

21 O/8E

The Rogers Lake group (57 claims) is approximately 40 km southwest of Bathurst and 2 km north of Roger Lake. The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of three drill holes (252.39 m) to test Max-Min anomalies that had been found in previous exploration. Graphitic sedimentary rocks were encountered but significant sulphide mineralization was not.

(c) CLEARWATER LAKE Claim Gp. (473501)

21 O/1W

Confidential until May 12, 1990. This group of 88 claims is north of Clearwater Lake, about 60 km northwest of Newcastle. A 1.38 km grid was established and a horizontal-loop EM survey was conducted.

(d) CHESTER Claim Gp. (473475)

21 O/1E

Confidential until March 2, 1990. This group of 3 claims is approximately 150 m west of the Chester mine adit. Clearwater Stream runs through the property. A total of 101 soil samples were collected and analysed for 28 elements.

(e) CHESTER NORTH Claim (473479)

21 O/1E

This property consists of a single claim that is about 25 km southwest of Heath Steele and 1 km northwest of the old Chester mine. The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of a soil-geochemical survey (24 samples); the samples were analysed for 28 elements by ICP but no anomalies were found.

29. Claude Willett

CLUSTER Claim Gp. (473574)

21 O/9E

This group of 18 claims is located in the California Lake area, approximately 40 km southwest of Bathurst. Linecutting, geophysical surveys (VLF EM, magnetometer), and soil sampling and analysis (As, Ag, Au) were carried out.

30. Murray Brook Resources Incorporated and Martin D. Kierans

CALIFORNIA LAKE Claim Gp. (473596)

21 O/8E

Confidential until December 14, 1990. This group of 135 contiguous claims is approximately 55 km west-southwest of Bathurst. A 27.7 km grid was established and prospecting and geological mapping were carried out. Magnetic and VLF EM surveys were completed. A total of 10 heavy-mineral-concentrate, 36 silt, and 988 B-horizon soil samples were collected; 793 soil samples were analysed for 28 elements.

31. Donald C. Graham

HEADWAY NORTH Claim Gp. (473581)

21 P/5W

Confidential until November 28, 1990. This group of 10 claims is about 3 km southwest of Brunswick No. 12 mine. A 12.5 km grid was cut and 8 claims were prospected. Magnetic and VLF EM surveys were conducted and a core inventory was made.

32. Ian A. Graham

(a) HEADWAY Property, M.L. 1252 (473446)

21 P/5W

This property is about 3 km south of the Brunswick No. 12 mine and 30 km southwest of Bathurst. A 3.1 km grid was cut and magnetic and geological surveys were carried out. A total of 46 rock and 74 till samples were collected and analysed for Cu, Pb, Zn, Ag, and As.

(b) HEADWAY Claim Gp. (473582)

21 P/5W

Confidential until November 28, 1990. This 15-claim group is approximately 25 km southwest of Bathurst and 3 km south of Brunswick No. 12 mine. The property is underlain by sedimentary and volcanic rocks of the Tetagouche Group. A soil geochemical survey (74 samples of C-horizon till)

for Ag, As and Au was conducted down-ice from the known sulphide zone. Also geologic mapping was conducted along lumber roads and in the previously excavated trenches. Forty-five rock (grab and/or channel) samples were collected but no assays are reported.

33. UMEX Inc.

HARTTS LAKE Claim Gp. (473553)

21 O/8W

This 30-claim block is approximately 55 km southwest of Bathurst and less than 1 km east of Hartts Lake. The property is underlain by felsic volcanic rocks of the Tetagouche Group. A grid was established over the southwestern part of the property and Max-Min I and Omni Plus (combined VLF EM and magnetometer) surveys were conducted. Three weak conductors were delineated.

34. John A. Duffy

TAYLOR BROOK Claim Gp. (473514)

21 O/8E

This property comprises 19 claims and Mining Licence 1296. It is approximately 8 km north-northeast of the Heath Steele mine. All previous work was compiled and recommendations made for future exploration.

35. Kidd Creek Mines Ltd.

HALFMILE LAKE Property, M.L. 998 (473485)

21 O/8W

The Halfmile Lake base metal deposit, Mining Licence 998, is about 19 km west of Heath Steele. The property is underlain by Tetagouche Group rocks. A trenching programme (9 trenches totalling 465 m) was conducted to evaluate the gold and silver potential of the gossan above the sulphide deposits. About 13 600 t of ore, grading 1.7 g/t Au and 43 g/t Ag, was outlined.

36. Arnold Somers

LITTLE SEVOGLE RIVER Claim Gp. (473484)

21 J/16E

This 4-claim block is about 35 km east-southeast of the Heath Steele mine along the Little SevoGLE River. The property is underlain by felsic volcanic rocks of the Ordovician Tetagouche Group. A previously known "mineralized chert" was sampled (2 samples) and 12 soil samples were collected in the vicinity. The soil samples were analysed for Cu, Pb, Zn, Ag, and Au with the highest values being 320 ppm, 40 ppm, 76 ppm, 1.2 ppm, and 40 ppb, respectively. A composite of the two rock samples assayed 5850 ppm Cu, 8600 ppm Pb, 16 600 ppm Zn, and 19.3 ppm Ag.

MAGAGUADAVIC - ST. CROIX ZONE

2. Brunswick Mining and Smelting Corporation Limited

(aa) SOUTH OROMOCTO Claim Gp. (473520)

21 G/7E

Confidential until July 12, 1990. This 47-claim group is at Back Clarendon, southwest of the Village of Wirral, on Highway 101. The property

is along the southwestern extension of the Pendar Brook fault zone, which represents a major tectonostratigraphic terrane boundary. The Upper Silurian-Lower Devonian metasediments in this area are intensely sheared and they are cut by Devonian granodioritic stocks and dykes. Gold occurs in silicified shears and quartz veins along the contact of the intrusions. During 1988, the company conducted VLF EM and soil-geochemical surveys to assist in tracing the auriferous zone.

5. Maritime Resource Research Ltd.

(b) JOHNSON CROFT Claim Gp. (473512)

21 G/8E

Confidential until June 8, 1990. This 8-claim group is immediately north of Browns Flat, about 30 km north of the City of Saint John. The area is mostly underlain by siltstone and fine-grained sandstone of the Silurian Jones Creek Formation, which are intruded by granophyric and alkali granite and alkali quartz syenite and alkali syenite.

Stringers and massive pods of sphalerite, galena, siderite, and quartz associated with the prominent McKeel Lake Fault were first discovered in this area about 1942 by the New Brunswick Department of Lands and Mines. In 1968, Ran Lux Mining Ltd. found a mineralized breccia zone with sphalerite and galena farther south along this structure. In 1988, the company conducted a rock-sampling programme to determine possible extension of the earlier-found occurrences.

(c) BAULD HILL WEST Claim Gp. (473550)

21G/9E

Confidential until September 13, 1990. The claim group is about 1.5 km east of the Settlement of Wickham, about 40 km north of the City of Saint John. The area is underlain by Silurian sedimentary and mafic volcanic rocks, which are intruded by Devonian granite. The company selected a series of representative 2 m rock chip samples, which were analysed for 30 elements.

37. Dominion Explorers Inc.

M.L. 1235 (473603)

21 G/14E

Confidential until December 29, 1990. This property is located near Lake George, 30 km west of Fredericton. The shaft was deepened by 68.6 m.

38. Morton Gordon

(a) ARENA Claim Gp. (473543)

21 G/3W

This claim is immediately south of Highway 1, within the boundary of the Town of St. Stephen, southwestern New Brunswick. The area is underlain by Ordovician metasediments of the Cookson Formation that are intruded by Devonian mafic-ultramafic stocks and dykes. Nickel, copper, and cobalt sulphides occur in the intrusions and in the metasediments along the contacts. Small amounts of gold and platinum-group minerals are associated with these sulphides.

(b) TRUE HILL Claim Gp. (473477)

21 G/7W

Confidential until March 7, 1990. The 46-claim True Hill group covers the True Hill granite stock, about 4 km west of Mount Pleasant, in southwestern New Brunswick. The True Hill stock intrudes fine-grained

greywacke and slate of the Silurian to Lower Devonian Waveig Formation. A tin-base-metal-sulphide lode was discovered here in 1964. The chloritization, silicification, and greisenization associated with this deposit is similar to that of the Mount Pleasant deposit. Small amounts of magnetite are also associated with the mineralization, similar to the tin-bearing lode west of the Magaguadavic River (41a). Limited amounts of soil geochemical, geophysical, and diamond-drilling programmes have been carried out by several companies since that time. The present company conducted a magnetometer survey on the property during 1988 to assist in discovering additional tin-bearing lodes.

39. Cobrun Mining Corporation

ST. STEPHEN Ni Claim Gp. (473495) 21 G/3W
Confidential until April 13, 1990. The claim group is about 3 km northwest of the Town of St. Stephen, in southwestern New Brunswick. The 30-claim group covers a Devonian mafic-ultramafic intrusive complex that contains massive nickeliferous pyrrhotite, pentlandite, and chalcopyrite in three distinct mineralized zones. Small amounts of platinum and palladium are associated with these sulphides. The company is investigating the platinum and palladium potential of the deposits and the possibility of metal extraction by bacterial leaching.

40. Goldfluor Exploration Limited

(a) LOWER TOWER HILL Claim Gp. (473578) 21 G/6E
The claim group is in the Tower Hill area, about 30 km northeast of the Town of St. Stephen. The area is underlain by polydeformed, pyritiferous, graphitic slate, siltstone, and quartzite of the Ordovician Cookson Formation. This area is part of the Honeydale Thrust Fault zone. Auriferous quartz-carbonate veins occur along northeast-striking shear zones and along the crests of associated cross folds that deform the regional penetrative cleavage. The company conducted a trenching and sampling programme. Assays from grab samples ranged from 0.03 to 13 g/t Au. Previous grab samples yielded up to 36 g/t Au.

(b) LITTLE McDOUGALL LAKE Claim Gp. (473487) 21 G/7E
Confidential until March 23, 1990. The 49-claim group is immediately south of Little McDougall Lake, and 4 km west of South Oromocto Lake, in southwestern New Brunswick. The oldest rocks in the area are greywacke, siltstone, and slate of the Upper Silurian to Lower Devonian Waveig Formation. The metasediments are cut by three distinct intrusive phases of the Devonian Saint George Batholith, which range in composition from granodiorite to granite.

Exploration by MEX Exploration Ltd. in 1979-1980 led to the discovery of high-grade argentiferous base-metal-sulphide-bearing boulders and wolframite-bearing quartz veins. This company conducted geochemical and IP surveys on the property. The better geochemical anomalies coincided with soil-geochemical anomalies. Mapping by the Geological Surveys Branch in 1987 led to the discovery of a wolframite-bismuthinite-bearing quartz vein that assayed 5.83 g/t Au. Current work by personnel of Goldfluor Exploration Limited, Falconbridge Limited, and International Corona Resources Ltd. on the property consisted of geologic mapping and prospecting. Seventy-five mineralized samples were analysed.

41. Peter Fenety and Roy McIntyre

(a) WEST MAGAGUADAVIC Claim Gp. (473519)

21 G/7W

This 4-claim group is on the west bank of the Magaguadavic River, 10 km southwest of Mount Pleasant. The claim group is immediately east of the Devonian Pleasant Ridge granite stock, which intrudes interbedded grey-wacke and slate of the Silurian-Lower Devonian Waveig Formation. The ground was staked to cover a prominent shear zone, about 3 m wide and containing tin minerals, base-metal sulphides, hematite, and magnetite. The claim holders collected 27 samples from the vein. Small amounts of gold (up to 904 ppb) Au and silver (up to 89.14 g/t) were detected in nearly all these samples.

(b) CUNDY LAKE Claim Gp. (473482)

21 G/7E

The Cundy Lake group of 14 claims is on the west side of West Long Lake, about 30 km north of St. George, and covers one of several gold occurrences along the northwestern margin of the Devonian Saint George Batholith. The group straddles the contact between the youngest granitic phase of the batholith and the highly deformed Silurian-Lower Devonian sedimentary rocks of the Waveig Formation. The sedimentary rocks are intensely veined by quartz and silicified in places.

The most recent work consisted of limited soil-sampling and VLF EM surveys. Soil samples showed slightly anomalous amounts of Cu, Pb, Zn, and Ag across the conductive zone. Small amounts of gold were also detected.

42. Gilbert Frenette

SAND BROOK Claim Gp. (473486)

21 G/7E

This 8-claim group is southwest of the Village of Wirral, and 55 km south of the City of Fredericton. The gold occurrence covered by the claim group is in Silurian hornfels near the contact of a Devonian granite intrusion. This area is part of the gold-bearing zone associated with the Pendar Brook Fault, which has been traced for more than 25 km. The discovery showing is a 0.3 m wide quartz-carbonate vein with pyrite, arsenopyrite, and small amounts of base-metal sulphides. Two recent grab samples taken from the vein by personnel of Rio Algom Exploration Ltd. assayed 17.83 and 2.74 g/t Au, respectively. Twelve chip samples collected from the hornfels outside the vein yielded gold values ranging from 1 to 56 ppb Au.

43. William Carter

BALD HILL Claim Gp. (473557, 473573)

21 G/7E

This prospect consists of adjoining 8- and 5-claim groups northeast of the Sand Brook prospect (473486). This area is part of the gold-bearing zone associated with the Pendar Brook Fault. The gold potential of the 8-claim group was investigated by collecting 45 rock samples and analysing 26 of these. Nine of the samples assayed between 10 and 300 ppb Au and between 0.1 and 0.2 ppm Ag and significantly elevated values in Cu, Pb, and Zn. A total of 23 rock samples were collected from the 5-claim group. Several of these samples showed elevated Cu, Pb, and Zn values, but gold and silver values were much lower than those assayed from the 8-claim group.

44. Edgar Brown

THREE BRIDGE BROOK Claim Gp. (473542)

21G/8W

This 10-claim group is about 12 km northwest of the Village of Welsford, 55 km south of the City of Fredericton. The group was staked to cover an altered fracture zone in the Late Devonian Mount Douglas granite, which intrudes Silurian metasediments. Disseminated argentiferous galena and sphalerite with small amounts of cadmium and gold occur in the fracture zone. Five samples collected from the mineralized fracture zone assayed 0.2-2.8% Pb, 0.7-17% Zn, 0.02-0.12% Cd, and 25.71-54.51 g/t Ag. The best gold assay yielded 0.27 g/t Au.

45. Grand Empire Exploration Limited

SAND BROOK EXTENSION Claim Gp. (473558)

21 G/7E

The Sand Brook Extension group (50 claims) is southwest of the Village of Mirral, 55 km south of the City of Fredericton. The area is underlain by hornfelsic metasediments of the Upper Silurian to Lower Devonian Waweig Formation, which is intruded by Middle Devonian granodiorite and granite. The occurrence is part of an intensely deformed gold-bearing zone associated with the Pendar Brook Fault, which is the boundary between two tectonostratigraphic terranes. The discovery outcrop contains a narrow (about 30 cm maximum), steeply dipping quartz vein with arsenopyrite and pyrite. Grab samples from the vein assay up to 17.83 g/t Au. In 1988, the company blasted the mineralized outcrop to obtain fresh samples. Fifteen samples of this material assayed between 0.10 and 15.10 g/t Au. VLF EM and magnetometer surveys were conducted on the property as an aid to explore for other auriferous veins or stockworks on the property.

46. Roy McIntyre and Peter Fenety

SHEAR GOLD MINE Claim Gp. (473456)

21G/07E

The claim group is just west of Highway 101 that leads south from Mirral to South Oromocto Lake, about 55 km south of Fredericton. The area is underlain by hornfelsic greywacke, siltstone, and slate of the Upper Silurian-Lower Devonian Waweig Formation, which have been intruded by Middle to Late Devonian granite. Grab samples from silicified metasediments with disseminated pyrite and base-metal sulphides collected by the claim holders assayed up to 9.60 g/t Au and 58.29 g/t Ag. Samples reported from an old 10.6 m deep shaft were reported to assay 17.14 g/t Au. These encouraging results led to the optioning of the property by Stratabound Minerals Corp. This company conducted soil geochemical, VLF EM, and magnetometer surveys on the property. A trenching programme was based on these results. As a result of this work, gold-bearing veins and small stockworks were found in four areas. Gold assays from samples of this material ranged from 0.058 to 2.33 g/t Au.

47. Falconcrest Resources Inc.

KERR LAKE Claim Gp. (473563)

21 G/7E

Confidential until October 26, 1990. This 9-claim group is 1 km south of Disappointment Lake, 40 km northeast of the Town of St. George in southwestern New Brunswick.

The claims cover part of the Late Devonian Mount Douglas granite, which constitutes the eastern part of the Saint George Batholith.

The property is in hornfelsic sedimentary rocks of the Upper Silurian to Lower Devonian Waveig Formation, which has been intruded by Middle to Late Devonian granite. The area constitutes part of the gold-bearing zone related to the Pendar Brook Fault.

Gold, arsenopyrite, and pyrite occur in a quartz vein up to 30 cm wide that cuts across hornfels. Two grab samples from the vein assayed 17.83 and 2.74 g/t Au, respectively. Grab samples from the hornfels locally assayed up to 17.79 g/t Au.

48. Peter Fenety, Roy McIntyre, and Kenneth D.A. Whaley

CUNNINGHAM CREEK Claim Gp. (473460)

21 G/8W

This 14-claim group is west of the new Saint John-Fredericton Highway, at Nerepis, 30 km north of the City of Saint John. The area is underlain by Upper Silurian sedimentary rocks that are intruded by Late Devonian granite.

The Nerepis area has been explored by several companies since the 1950s, which resulted in the discovery of numerous base metal, tin, gold, bismuth, and cobalt occurrences of economic interest. The mineralized structures are related to the Wheaton Brook Fault, which separates Precambrian and Silurian rocks.

A limited soil- and rock-sampling programme was conducted on the claim group. Numerous boulders containing base metals were found on the property.

49. Atlantic Goldfields Inc.

NEREPIS Claim Gp. (473455)

21 G/8W

The Nerepis group (24 claims) is located on the Saint John-Fredericton Highway, 25 km north of Saint John. An 11.6 km grid was established and 5 trenches were excavated to a total length of 15 m. Geological and geophysical (VLF EM-16, proton magnetometer, IP) surveys were carried out. A total of 320 soil (B-horizon) and 82 rock samples were analysed for Cu, Pb, Zn, Ag, and Au.

50. Derek F. Brown

JAKE LEE BROOK Claim Gp. (473579)

21G/2E

This 6-claim group is north of the Village of Pennfield, 49 km west of the City of Saint John. This area is underlain by Silurian sedimentary rocks and mafic and felsic tuffs, which are intruded by Devonian gabbro and granite. The area was originally staked as a base metal prospect by New Jersey Zinc. A stream-sediment sampling programme conducted by the claim holder in 1983 showed anomalous gold (100-220 ppb Au) in 5 out of 20 samples.

In 1984, Rio Algom evaluated the property and found 6 out of 33 samples to be anomalous. The highest was 5280 ppb Au. In 1988, magnetometer and VLF EM surveys were conducted on the property to assist in delineating possible gold-bearing structures in bedrock. The VLF EM survey detected a conductor, which probably coincided with an IP anomaly that was previously delineated by New Jersey Zinc.

51. LAC Minerals Limited

ANNIDALE Claim Gp. (473599)

21 H/13W

The Annidale group of claims, 2 km north of Annidale and 20 km west-northwest of Sussex, include the Annidale copper-gold deposit. The deposit is in a northeast-trending belt of Ordovician and/or Silurian argillaceous sedimentary rocks with intercalated mafic flows, tuffs, and related intrusive rocks. In 1988, 170 basal till samples were collected and analysed for Cu, Pb, Zn, Ag, As, and Sb. Previous survey data was compiled. Samples of core stored at Sussex were analysed for Au, Cu, Pb, Zn, Ag, Cr, and As.

CALEDONIA ZONE

1. Northeast Exploration Services Limited

(bb) BLACKWOOD and FORTY FIVE RIVER Claim Gps.
(473546)

21 H/10W

The 16-claim Blackwood and 14-claim Forty Five River claim groups are near Teahans Corner, immediately north of Fundy National Park. The area is underlain by mafic and felsic volcanic and sedimentary rocks of the Late Precambrian Coldbrook Group. Reports of visible gold in boulders and stream sediments from this area were first reported in the 1860s.

In 1988, Northeast Exploration conducted a limited stream-sediment and till sampling programme. A stream-sediment sample on Keirstead Brook, just above the road, assayed 110 ppb Au. In 1985, Acadia Mineral Ventures also found anomalous gold in this area. A sample assaying 21 ppb Au was found in Forty Five River. The higher values in this area appear to be associated with northwest-trending sensitivity lows delineated in an airborne survey conducted by the New Brunswick Department of Natural Resources in 1972.

5. Maritime Resource Research Ltd.

(d) BLACK RIVER Claim Gp. (473537)

21 H/5W

This 33-claim group is along the Bay of Fundy coast, about 20 km southeast of the City of Saint John. This area is part of a complex thrust zone comprising Precambrian mafic and felsic volcanic rocks, Precambrian granite and granodiorite, Carboniferous or older arkosic sedimentary rocks and Carboniferous quartzose sandstone and conglomerate. In 1988, a total of 170 till samples were collected. No assays were available for these samples at the time of writing this report.

10. Lacana Mining Corporation Limited

(g) MACKINS LAKE Claim Gp. (473528)

21 H/5W

Confidential until July 28, 1990. This 16-claim group is west of Mackins Lake, 7.5 km east of the City of Saint John, in the Bay of Fundy coastal area. The claims cover an area underlain by Precambrian mafic and

felsic volcanic rocks. Company personnel prospected the claims and mapped the geology; stream-sediment and selected rock samples were assayed.

(h) POLLETT RIVER Claim Gp. (473529)

21 H/11E

Confidential until July 28, 1990 The Pollett River group of 24 claims lies next to the northern boundary of Fundy National Park, 13 km northwest of the Village of Alma. The area is underlain by felsic and mafic volcanics and sedimentary rocks of the Late Precambrian Coldbrook Group. The Teahan low-grade base-metal-sulphide-gold deposit is northeast of the prospect. In 1988, the property was prospected and 44 rock samples and 22 silt samples were assayed.

38. Morton Gordon

(c) RETREAT LAKE Claim Gp. (473604)

21 G/1W

Confidential until January 3, 1991. This group of 20 claims is 3 km west of Chance Harbour and about 35 km west of Saint John. An 8.85 km grid was cut. General prospecting, trenching (3 trenches 75 m in length), and a Max-Min II survey were carried out. One sample was collected and analysed for graphite content.

(d) BONNEY ROAD Claim Gp. (473533)

21 H/5W

Confidential until August 14, 1990. This 18-claim group is east of Nauwigewauk, about 30 km northeast of the City of Saint John. The ground was staked to cover a limestone deposit, which constitutes part of the Carboniferous Windsor Group. Heath Steele Mines Limited conducted a diamond-drilling programme on the property between 1970 and 1972. In 1988, a grid was established on the property and samples were collected for chemical analyses.

52. Lombard Consolidated Resources Inc.

CLEAR LAKE Claim Gp. (473500)

21 G/1W

Confidential until June 9, 1990. This 15-claim group was staked to cover a graphite prospect 3 km north of Dipper Harbour along the Bay of Fundy coast, 35 km west of Saint John. The area is underlain by a series of thrust slices composed of Precambrian mafic and felsic volcanic rocks, Precambrian granite and Carboniferous limestone and clastic sedimentary rocks. The graphite occurrence is along the faulted contact of Precambrian volcanics and Carboniferous or older slate. In 1988, VLF EM and magnetometer surveys were conducted on the property and a soil-geochemical programme was carried out to evaluate the gold potential. Prominent gold occurrences were previously found at Dipper Harbour and Little Dipper Harbour along the Bay of Fundy coast, south of the property.

53. Newbrun Resources Ltd.

WEST MUSQUASH HARBOUR Claim Gp. (473457)

21 G/1W

Confidential until February 3, 1990. This group of 9 claims covers a gold-bearing quartz-stockwork along the west side of Musquash Harbour, about 25 km southwest of the City of Saint John. This area is part of a complex thrust zone comprising carbonates and clastics of the Precambrian Green Head Group, mafic and felsic volcanic rocks of the Precambrian Coldbrook Group, Precambrian granite and diabase, and Carboniferous lime-

stone and clastic sedimentary rocks. The gold occurrences are hosted by granite. In 1988, the claims were prospected and a magnetometer survey was carried out.

54. William Walton

ACAMAC Claim Gp. (473513)

21 G/8E

This 11-claim group is at Acamac about 10 km northwest of the City of Saint John. The area is underlain by dolomitic limestone of the Precambrian Greenhead Group. The ground was staked, mapped, and sampled by several companies between 1966 and 1975 for its limestone potential. William Walton restaked the area in 1986 and it was mapped and prospected in 1988 by personnel of Gordex Investments Ltd. This company also conducted a proton magnetometer survey of the property.

55. Great Horn Mining, Inc.

GHOST LAKE Claim Gp. (473517)

21 G/8E

Confidential until June 28, 1990. The 32-claim Ghost Lake group is about 10 km west of the downtown area of the City of Saint John and is within the city limits. The area is underlain by limestone, dolomite, carbonate conglomerate, argillite, and siliceous metasediments of the Precambrian Green Head Group, which are intruded by Precambrian granodiorite and gabbro. In 1988, the geology of the property was mapped and a series of representative carbonate samples were collected for chemical analysis.

56. Robert Baxter

(a) GOLDEN GROVE Claim Gp. (473538)

21 H/5W

Confidential until August 21, 1990. The Golden Grove group (12 claims) is immediately north of the settlement of Coldbrook, 8 km northeast of the City of Saint John. The southern part of the property is cut by the Clover Hill Fault.

The rocks north of the fault are Precambrian granodiorite, gabbro, biotite paragneiss, quartzite, and limestone. South of the fault are mafic and felsic volcanic rocks of the Coldbrook Group. Late Precambrian volcanic rocks are exposed in the southwestern part of the claim group. A VLF EM survey was conducted on the property in 1988 to delineate possible gold-bearing fracture zones.

(b) MECHANIC SETTLEMENT Claim Gp. (473549)

21 H/11W

Confidential until September 12, 1990. This 77-claim group, 20 km southwest of the Town of Sussex, was optioned by International Corona Resources Ltd. The claims cover a Precambrian layered complex composed of peridotite, troctolite, olivine gabbro and gabbro that intrudes volcanic and sedimentary rocks of the Coldbrook Group. Platinum-group elements of economic interest occur locally in peridotite and tractolite. The company has conducted overburden drilling, magnetometer, and VLF EM surveys on the property.

57. Mispec Resources Inc.

(a) BALLS LAKE Claim Gp. (473498)

21 H/4W

The Balls Lake group is about 6 km southeast of the Saint John city limits. Early in the century, gold was apparently found in this area near Thomas Brook and Southern Lake. The area is underlain by quartzose sandstone and conglomerate of the Carboniferous Balls Lake and Lancaster formations.

In 1985, anomalous amounts of gold ranging from 227 to 720 ppb Au were found by the present claim holder near Balls Lake. In 1987, one hole drilled into the property intersected some weakly altered, pyritiferous sedimentary rocks, but the core was not assayed. In 1988, a survey grid was established on the property and a 10 km IP survey was conducted. Drilling and trenching of the anomalies was recommended.

(b) CAPE SPENCER Property, M.L. 1347 (473454)

21 H/4W

Confidential until November 30, 1989. This property is east-northeast of the Cape Spencer lighthouse, and about 16 km east of Saint John. An 18.2 km grid was established and the area was prospected and mapped. Four trenches totalling 500 m in length were dug. An IP survey was carried out. One hundred and twenty-three holes were drilled to a total depth of 6092.69 m. Core was sampled and assayed for gold.

58. Cuvier Mines Inc.

BLACK RIVER Claim Gp. (473591)

21 H/5W

The Black River claim group is along the Bay of Fundy coast, 12 km southeast of the City of Saint John. The area is underlain by a series of thrust slices composed of Precambrian granite and granodiorite, Carboniferous or older sandstone and conglomerate, and Carboniferous quartzose sandstone and conglomerate. These rocks constitute part of the Cape Spencer-Black River gold-bearing zone, which includes the gold deposits of Gordex Minerals Limited and Mispec Resources Inc. Gold values to 3.77 g/t were found in quartz-hematite veins. In 1988, a total of 354 C-horizon samples were collected for gold analysis. Several anomalies were detected. Magnetic and VLF EM surveys were conducted to delineate fracture zones and trace favourable rock units.

59. Brunex Gold Resources Limited

BLACK RIVER Claim Gp. (473483)

21 H/5W

Confidential until March 17, 1990. This 24-claim group is at Black River, 18 km southeast of the City of Saint John. The area is underlain by a series of thrust slices composed of Precambrian mafic volcanic and sedimentary rocks, Precambrian granite and granodiorite, and Carboniferous or older arkosic sedimentary rocks. These rocks constitute part of the Cape Spencer-Black River gold-bearing zone, which includes the gold deposits of Gordex Minerals Limited and Mispec Resources Inc. In 1988, company personnel conducted soil-geochemical and geophysical surveys and prospected the ground systematically along grid lines.

60. Stratabound Minerals Corp.

ALMA Claim Gp. (473552)

21 H/10W

The Alma group of 20 claims is about 4 km northeast of the Village of Alma, immediately east of Fundy National Park, along the Bay of Fundy coast. The area is underlain by mafic and felsic volcanics and sedimentary rocks of the Late Precambrian Coldbrook Group. The rocks are intruded by Late Precambrian granite. Pyrite is commonly abundant in intensely sheared felsic tuffs in the central and southern part of the property. Small amounts of copper sulphides and gold have also been found in a few localities. The company conducted a limited trenching and silt sampling programme.

Several companies including Noranda Exploration Company, Limited, MEX Exploration, Shell Canada, and Billiton Canada Ltd. conducted geo-physical, geological, and soil geochemical surveys on the property. One hole drilled by Billiton Canada Ltd. intersected a mineralized greisen vein. Re-analysis of a 17.6 m section of this core yielded 0.25% Sn and a 5.2 m section contained 0.58% Sn.

Falconcrest Resources Inc. conducted a RADEM VLF EM survey on the property during 1988.

61. J.A. Roy McIntyre

RAT TAIL BROOK Claim Gp. (473531)

21 H/15W

The Rat Tail Brook claim group is centred around the "old Lumsden mine," which is about 30 km south of the City of Moncton. The ground was staked because gold assays ranging from 3.4 to 10.3 g/t Au were reported from the old mine. The claim group is underlain by mafic and felsic volcanic rocks of the Precambrian Coldbrook Group, which are intruded by Precambrian granite and granodiorite. Some VLF-EM profiles were run on the property and 46 rock samples were assayed. The sample localities were tied in to flagged control lines. Gold assays of 18 samples ranged between 2.4 and 22.6 g/t Au.

MONCTON - CUMBERLAND BASIN

5. Maritime Resource Research Ltd.

(e) GLEBE MINE Claim Gp. (473499)

21H/11W

This 4-claim group is 11 km south of the Town of Sussex. The ground was staked to cover a limestone deposit that grades in excess of 94% CaCO_3 . The limestone is part of the Carboniferous Windsor Group, which overlies red conglomerate and sandstone of the Moncton Group.

In 1988, the geology of the property was mapped and 16 rock samples were assayed for 40 elements. The assays ranged from 52.73 to 57.02% CaO , which indicate that the limestone is of high quality. Silver, lead, and zinc are the only metallic elements that occur in anomalous amounts.

62. Barbara Durling

(a) HILLSBOROUGH Claim Gp. (473490)

21 H/15E

Confidential until April 4, 1990. The 34-claim Hillsborough group covers an extensive gypsum-anhydrite deposit at Hillsborough, 15 km south of

the City of Moncton. The claim group is underlain by limestone and gypsum of the Carboniferous Windsor Group, which overlie red conglomerate and sandstone of the Moncton Group. The Windsor Group is overlain by red sandstone and conglomerate of the Hopewell Group. The gypsum-anhydrite deposit was quarried from about 1930 to 1980 by the Canadian Gypsum Company.

Gypsum required for a wallboard plant in McAdam, southwestern New Brunswick, caused renewed interest in the quarry and other potential quarry sites in the region. Work in 1988 consisted of diamond drilling and sampling to establish reserves at the present quarry and prospecting in the area in search of possible additional quarries.

(b) DEMOISELLE Claim Gp. (473491)

21 H/15E

Confidential until April 4, 1990. This 18-claim group covers a gypsum deposit south of Albert Mines, 20 km south of the City of Moncton. The area is underlain by limestone and gypsum of the Windsor Group, which overlie red conglomerate and sandstone of the Moncton Group. The Windsor Group is overlain by red sandstone and conglomerate of the Carboniferous Hopewell Group. The gypsum deposit was quarried by the Canadian Gypsum Company between 1930 and 1980. In 1988, a diamond drilling and sampling programme was undertaken to establish ore potential of the quarry and the surrounding area was prospected for other potential quarry sites.

(c) PICADILLY MOUNTAIN Claim Gp. (473522)

21 H/11W

The Picadilly Mountain group (14 claims) was staked to cover a gypsum deposit 110 km east of the Town of Sussex. The area is underlain by limestone and gypsum of the Carboniferous Windsor Group, which overlie red conglomerate and sandstone of the Moncton Group. The Windsor Group is overlain by red sandstone and conglomerate of the Hopewell Group.

The ground was staked because it was closer to the proposed wallboard plant at McAdam than the existing quarries in Hillsborough. A diamond-drilling programme was carried out to determine the quality of the deposit. It was found that the gypsum has dissolved near surface in the area. The Hopewell Group remains as a brecciated unit.

(d) FOX HILL Claim Gp. (473524)

21 H/12E

This 10-claim group was staked to cover a gypsum deposit about 4 km west of the Town of Sussex. The area is underlain by limestone and gypsum of the Carboniferous Windsor Group. The Windsor Group overlies red conglomerate and sandstone of the Moncton Group and it is overlain by red sandstone and conglomerate of the Hopewell Group.

The deposit was staked because it is close to the Trans-Canada Highway and it is closer to the proposed plasterboard plant at McAdam than the existing quarries in Hillsborough. Around 1960, Domtar intersected gypsum in several drill holes on this property. In 1988, four holes were drilled into the deposit. Three of these holes intersected high-quality gypsum and one intersected only anhydrite.

(e) UPHAM Claim Gp. (473523)

21 H/5E

This 26-claim group was staked to cover a gypsum deposit about 30 km southwest of the Town of Sussex. The area is underlain by limestone and gypsum of the Carboniferous Windsor Group. The Windsor Group overlies red conglomerate and sandstone of the Moncton Group and is overlain by sandstone and conglomerate of the Hopewell Group.

The deposit was staked because it was closer to the proposed plasterboard plant at McAdam than the existing quarries in Hillsborough. Four holes were drilled on the property, which intersected good quality gypsum. It was concluded that the property has potential for a small gypsum quarry.

CARBONIFEROUS PLATFORM

63. Little River Coal Company Ltd.

LONG ISLAND COAL Property, M.L. 1327 (473494)

21 J/1W

The "Long Island" Mining License is in central New Brunswick, immediately east of Minto.

The claims are in the Carboniferous Clifton Formation, which is part of the Pictou Group. Most of the Minto coal fields are within the Pictou Group. Previous drilling in the claim group delineated 55 338 proven tonnes of coal over an area of 114 367 m². The potential for additional tonnage is considered favourable. Most recent work on the area focused on using available satellite data to delineate target zones for additional coal reserves on the Long Island group. Four target areas were delineated as a result of this work. Radiometric, VLF EM, sensitivity, gravity, and seismic surveys were recommended prior to drilling.

METALLIC MINERAL DEPOSITS^{4,5}

Halfmile Lake Zinc, Lead, Silver, Copper

21 0/8W

In 1988, Falconbridge Limited controlled the Kidd Creek Mines Ltd. part of the Halfmile Lake deposit (Upper AB Zone), while Noranda Exploration Company, Limited controlled the Conwest part (Lower AB Zone) and Mattagami Lake Exploration Limited controlled the Main Zone.

The Halfmile Lake deposit (Figure 18) consists of one continuous horizon that is locally repeated by folding and faulting. The known strike length of the Halfmile Lake horizon is approximately 3 km to a depth of 975 m. The three zones (Upper AB, Lower AB, and Main) all contain variable amounts of sphalerite, galena, and chalcopyrite. Stratigraphic evidence indicates the sequence has been overturned, with the stringer zone occurring above the massive sulphides.

Reserves according to Huska (company report, 1977) and Platt (company report, 1982) are: 2 100 000 t grading 6.55% Zn, 2.26% Pb, 0.45% Cu, 37 g/t Ag for the Upper AB Zone; 7 900 000 t grading 7.45% Zn, 2.43% Pb, 0.10% Cu, 22 g/t Ag for the Lower AB Zone; 800 000 t grading 10.06% Zn, 3.63% Pb, 0.08% Cu, 52 g/t Ag for the C Zone; and 1 088 600 t grading 4.63% Zn, 0.87% Pb, 0.46% Cu, 8.9 g/t Ag for the Main Zone.

Between 1987 and 1988 deep drilling has been carried out by Noranda Exploration Company, Limited and Brunswick Mining and Smelting Corporation Limited.

Millican Lake Gold

21 H/4

The Millican Lake deposit, 15 km east of the City of Saint John, extends from the Cape Spencer deposit northeast to Millican Lake (Figure 18). An extension diamond drilling programme was carried out in 1988.

Mount Pleasant Tungsten, Molybdenum

21 G/7W

LOCATION The Mount Pleasant property is about 50 km northeast of St. Stephen, Charlotte County (Figure 18).

RIGHTS In 1988, Billiton Metals Canada Inc. held Mining Licence 1255 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY The LAC/Billiton tin project is operated by LAC Minerals Ltd. with head offices at 2105 N. Tower, P.O. Box 156, Royal Bank Plaza, Toronto M5J 2J4. Mine Office address is P.O. Box 150, St. George, New Brunswick EOG 2Y0. The President is P. Allen and Vice-President (Exploration) is R. Valliant; Resident Geologist is G. Kooiman.

HISTORY A group called Geochemical Associates staked Mount Pleasant in 1954 for Selco Exploration Ltd. Selco drilled four holes in a geochemical anomaly, but no metallic minerals of interest were intersected and the property was returned to Geochemical Associates.

In 1956, Kennco Exploration (Canada) Limited optioned the property and drilled ten holes, but the results were disappointing and Kennco dropped the option. Mount Pleasant Mines Ltd. staked the ground in 1959. Kennco optioned the property again and drilled several holes that intersected tungsten, molybdenum and tin minerals, but the option was dropped again because the mineralized zone could not be followed.

In 1960, a trenching and diamond-drilling programme combined with a detailed geological investigation by the Mount Pleasant Mines geological staff led to the discovery of a tin-base-metal ore zone in the northern part of the property. This ore zone is commonly referred to as the North Zone deposit. Deep drill holes also intersected tungsten-molybdenum ores in the northern part of the property (North Zone) and in the Fire Tower Zone (Mount Pleasant), but lack of sufficient funds prevented systematic drilling of these deeper ore zones. The delineation of the complex geology of the property guided subsequent exploration by Sullico Mines Ltd. This company optioned the property in 1967. Drilling by Sullico and later its wholly-owned subsidiary Brunswick Tin Mines Limited led to the delineation of the tungsten-molybdenum ore zones in the Fire Tower Zone and the North Zone.

In 1977, Billiton Canada Limited and Brunswick Tin Mines Limited made a joint venture agreement to bring the Fire Tower Zone's tungsten-molybdenum orebody (Fire Tower Zone West) into production. Mill construction and underground work were completed in 1983 when the first concentrates were produced. Commercial production started in 1984. The mine operated until July 31, 1985 and was forced to close as a result of very poor tungsten and metal prices.

On October 1, 1985, LAC Minerals entered a 50/50 joint venture agreement with Billiton to explore and possibly develop the North Zone tin deposit, located 1 km north of the present mine site. Since October 15, 1985, LAC Minerals has completed 2100 m of underground development to provide drill access to areas of the deposit where additional information was required. To the end of December, 1987, 18 124 m of underground drilling and 3364 m of surface drilling have been completed. Two bulk samples from underground totalling 2652 t were processed at the site and sent off for metallurgical analysis.

RESERVES: (Published) Reserves for the Fire Tower Zone are 12 220 000 t of ore grading 0.38% WO₃ and 0.2% MoS₂. The North Zone reserves are 5 900 000 t grading 0.79% Sn.

PRODUCTION There has been no production since 1985 and none is planned.

DEVELOPMENTS The feasibility study regarding the mining and processing of tin from the site was completed in late 1987, and was reviewed in 1988. The company decided not to proceed at this time due to the depressed state of the price of tin. During 1988, an evaluation program was also carried out to explore for other mineral occurrences on the property.

EMPLOYEES At the end of 1988 there were 6 employees on site.

NONMETALLIC MINERALS^{13,14}

During 1988, nonmetallic mineral exploration in the Province was virtually static with the exception of some limited activity associated with dolomite occurrences in Saint John County, limestone resources in Westmorland County, and gypsum in the Hillsborough area.

BP Resources Canada Ltd. (Mining Division) has not announced a decision to proceed with underground exploration of the Millstream potash property, 10 km west of Sussex.

Twelve applications for Peat Exploration licences were under review in 1988: Berger Mix Inc. (Bogs 4, 16, 305, 337A, and 354); Fafard Peat Moss Co. Ltd. (Bog 552); Lamèque Peat Moss Ltd. (Bog 25); Entreprises Premier CDN

Ltée (Bogs 306, 313, and 389); Roy Stewart (Bog 582) and Tourbière St-André Inc. (Bog 301).

Applications for Bogs 4, 16, 305, 313, and 582 have been rejected. Exploration licences have been issued to Fafard Peat Moss Co. Ltd. (Bog 552), Entreprises Premier CDN Ltée (Bog 389) and Berger Mix Inc. (Bog 354). Privileged options have been granted to Berger Mix Inc. (Bog 337A) and Entreprises Premier CDN Ltée (Bog 306).

PEAT¹³

Berger Mix Inc.

COMPANY Berger Mix Inc., 121, R.R. #1, St-Modeste, Québec, GOL 3W0. The contact person is Claudin Berger. Telephone (418) 862-4462.

RIGHTS Peat Exploration Licence 88-3 (186 ha) on Bog 354, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 354 is located 35 km southwest of Bay du Vin (Figure 18). Access is by Bay du Vin road and a logging road.

HISTORY Berger Mix Inc. applied for and received a Peat Exploration Licence in 1988.

RESERVES AND GRADE 10.29 Mm³ surficial peat and 1.82 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	186	146
Freehold (ha)	286	151
Total (ha)	472	297

Entreprises Premier CDN Ltée

COMPANY Entreprises Premier CDN Ltée, 454 Chemin Témiscouata, C.P. 2600, Rivière-du-Loup, Québec, G5R 4C9. The contact person is Germain Ouellet. Telephone (418) 862-6356.

RIGHTS Peat Exploration Licence 88-2 (578 ha) on Bog 389, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 389 is located 17 km west of Minto. Access is by a logging road off route 10 (Figure 18).

HISTORY Entreprises Premier CDN Ltée applied for a Peat Exploration Licence in 1987. A licence was issued in 1988.

RESERVES AND GRADE 7.38 Mm³ surficial peat and 3.75 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	578	341
Freehold (ha)	57	0
Total (ha)	635	341

Fafard Peat Moss Co. Ltd.

COMPANY Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, Gloucester County, New Brunswick. Telephone (506) 336-2325. The Manager is René Martin.

RIGHTS Peat Exploration Licence 88-1 (410 ha) on Bog 552, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 552 is located 6 km southwest of Black Rock. Access is by dirt road off route 635 (Figure 18).

HISTORY Fafard Peat Moss Co. Ltd. applied for and received a Peat Exploration Licence in 1988.

RESERVES AND GRADE 9.78 Mm³ surficial peat and 5.13 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	410	353
Freehold (ha)	0	0
Total (ha)	410	353

Jiffy Products (N.B.) Ltd.

COMPANY Jiffy Products (N.B.) Ltd., P.O. Box 360, Shippagan, N.B. EOB 2PO. The contact person is Alonzo Dupuis. Telephone: (506) 336-2284.

RIGHTS Peat Exploration Licence 82-3 (218 ha) on Bog 536, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 536 is located 8 km north of Tracadie, between Pont-Landry and Ste-Rose. Access is by dirt road off Highway 11 (Figure 18).

HISTORY Jiffy Products (N.B.) Ltd. acquired the Peat Exploration Licence in 1982. The company applied for a Peat Lease in 1988.

RESERVES AND GRADE 5.64 Mm³ surficial peat and 8.74 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	218	201
Freehold (ha)	47	19
Total (ha)	265	220

Satoturve Oy

COMPANY Satoturve Oy SF-27130, Eurajoki As, Finland. The contact person is Mikko Voutilainen. Telephone: (938) 80 600.

RIGHTS Peat Exploration Licence 87-2 (1213 ha) on Bog 324N, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324N is located 3 km south of Escuminac. Access to the bog is by logging roads off Highway 117 (Figure 18).

HISTORY Satoturve Oy applied for a Peat Exploration Licence in 1985. A licence was granted in 1987.

RESERVES AND GRADE 30.21 Mm³ surficial peat and 8.74 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	1213	927
Freehold (ha)	62	47
Total (ha)	1275	974

ENERGY RESOURCES

OIL SHALE²²

Cartago Resources Ltd.

21 H/15E

COMPANY Cartago Resources Ltd., 304 - 2466 West 3rd Avenue, Vancouver, British Columbia V6K 1L8. Telephone: (604) 732-1958. The President is Walter W. Storm and the Manager is Jessica Leeder.

RIGHTS Bituminous Shale Licence to Search L85-01 comprising 8998 ha. The licence is issued under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION Licence to Search L85-01 occupies an approximately rectangular area in Westmorland County between the Petitcodiac and the Memramcook rivers. The area includes the villages of Belliveau, Dover, Memramcook, St. Joseph, and Taylor Village (Figure 18).

HISTORY Oil shales have been known in the Westmorland County area for more than 100 years. In 1942, the Canada Department of Mines and Resources drilled seven core holes at Taylor Village totalling 320 m. In 1967 and 1968, the Atlantic Richfield Company drilled five exploratory oil shale holes in the Dover, St. Joseph, and Taylor Village areas.

The area was held under a Bituminous Shale Licence to Search by Canadian Occidental Petroleum from 1974 to 1981. They carried out an oil shale mapping survey and reported assay work on numerous surface samples.

Petro-Canada held a Bituminous Shale Licence to Search in the Westmorland County area from 1981 to 1984. They drilled 963 m of core in the three holes in the Dover and Boudreau Village areas.

EXPLORATION In 1985, sampling and assay work were undertaken on the Petro-Canada core. In 1986, a shallow drill hole (106 m) was put down in the Dover area. Trenching and assay work in 1987 confirmed the surface location of a high-grade oil shale zone on the licence.

DEVELOPMENTS No work was undertaken on the licence in 1988.

OIL AND NATURAL GAS²³

Acres International Limited

21 H/5

COMPANY Acres International Limited, 480 University Ave.,
Toronto, Ontario M5G 1V2

RIGHTS Geophysical licence GPL 88-01 and Geophysical permit GPP 88-01 under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976 and N.B. Regulation 86-191, Geophysical Exploration Regulation.

LOCATION Smithtown-Titusville area of Kings County, N.B.
(Figure 18).

DEVELOPMENTS Geophysical licence and geophysical permit were issued on June 28, 1988. A detailed 40 km gravity survey was carried out and completed in the summer of 1988.

Amoco Canada Petroleum Company Ltd.

parts of
21/A,B,G,H

COMPANY Amoco Canada Petroleum Company Ltd., 444-7th Ave. S.W.,
Calgary, Alberta T2P 0V2.

RIGHTS Geophysical licence GPL 87-01 and Geophysical permit GPP
87-01, under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976 and
N.B. Regulation 86-191, Geophysical Exploration Regulation.

LOCATION Offshore, Bay of Fundy.

HISTORY Geophysical licence and geophysical permit were issued
on August 19, 1987. Geochemical sniffer and sediment data surveys were
conducted in the Bay of Fundy. Sniffer and core coverage consisted of 1122
sniffer kilometres and 57 core locations.

Millford Resources Ltd.

21 O/6

COMPANY Millford Resources Ltd., 232 Woodvalley Ct. S.W.,
Calgary, Alberta T2W 5L8. The President is D.L. Smith.

RIGHTS ONG lic/on-sh 86-1 (17 480 ha) under the Oil and Natural
Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lic/on-sh 86-1 is located approximately 50 km
northeast of Grand Falls.

HISTORY The single licence to search was acquired by Millford
Resources Ltd. on March 14, 1986. A magnetometer survey was conducted in
August, 1986, along with a literature search.

DEVELOPMENTS Millford Resources Ltd. surrendered ONG lic/cn-sh
86-1, March 13, 1988.

Western Decalta Petroleum (1977) Limited

21 H/15

COMPANY Western Decalta Petroleum (1977) Limited, P.O. Box 2404,
Calgary, Alberta T2P 2M7.

RIGHTS ONG lse/on-sh 88-1, 88-2, and 88-3 (11 134.8 ha) under
Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lse/on-sh 88-1 to 88-3 inclusive are located
approximately 15 km south and southeast of Moncton (Figure 18).

HISTORY On January 1, 1988, ONG lic/on-sh 80-1 to 80-29,
inclusive, were converted to three leases.

OUTLOOK All three leases are in good standing.

Western Decalta Petroleum (1977) Limited,
Chevron Canada Resources Limited,
Irving Oil Limited

COMPANIES Western Decalta Petroleum (1977) Limited, P.O. Box 2404, Calgary, Alberta T2P 2M7. Chevron Canada Resources Limited, 500-Fifth Ave. S.W., Calgary, Alberta T2P 0L7. Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1.

RIGHTS ONG lic/on-sh 83-4 and 83-5 (66 072 ha) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lic/on-sh 83-4 is located 15 km north of Moncton; ONG lic/on-sh 83-5 is located 25 km northwest of Moncton (Figure 18).

HISTORY Licences to Search 83-4 and 83-5 were issued in October, 1983. A gravity survey and seismic programme conducted in 1983 and 1984 by Chevron Canada Resources Limited included portions of licences to search 83-4 and 83-5. To satisfy work requirements of ONG lic/on-sh 83-4 and 83-5, approval was given to group these licences with ONG lic/on-sh 80-8.

OUTLOOK ONG lic/on-sh 83-4 and 83-5 remain in good standing.

CHAPTER 3. MINE DEVELOPMENT IN NEW BRUNSWICK

METALLIC MINERALS^{17,4}

In New Brunswick, 1988 has proven to be a banner year for mineral development and production. Base-metal prices have reached highs that have not been seen for a number of years and the result has been a significant increase in base-metal exploration and development. One base-metal mine began production in 1988, two more began the regulatory process required to obtain a Mining Lease, and a fourth will begin the process. In addition to renewed interest in developing mines, the existing metal producer is experiencing an excellent return on investment and this will eventually reflect well throughout the mining community and support industry. The forecast for higher prices remains stable and on this basis interest in the base-metal sector is expected to continue.

East West Caribou Mining Limited (Caribou)

21 0/9W

LOCATION The Caribou deposit is approximately 40 km west of Bathurst in Restigouche County (Figure 19). (Lat. 47°34'N; Long. 66°17.6'W)

RIGHTS In 1988, East West Caribou Mining Limited held Mining Lease 246 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY East West Caribou Mining Limited, P.O. Box "A", Bathurst, N.B. E2A 3Z1. Head Office is East West Minerals, Inc., 3 Harbor Drive, Suite 103, Sausalito, California 94965. The Chief Executive Officer is Mr. Tony D.S. Wicks; Mine Manager is C. Smith.

HISTORY The mineralization was discovered in late 1955 by Anaconda Copper Mining Company through regional geological mapping using aeromagnetic maps and photo interpretation. Ground EM pin-pointed the drill target. Anaconda excavated an adit in the late 1950s, and in the late 1960s and early 1970s an incline was driven from the adit. Coincidentally, a 907 t/d mill with a copper concentrator was constructed. Mining of secondary (near-surface) copper took place between November, 1970 and November, 1971. Metallurgical problems caused shut-down. Production resumed in September, 1973 and continued for one year. Extractive metallurgical research on lead-zinc-copper ore is continuing. In 1983 heap leaching of gossan was completed. Gold and silver extracted in 1983 amounted to 88 582.77 g and 1 688 018 g, respectively. In late 1986, East West Minerals, N.L. of Sydney, Australia acquired Anaconda Canada Exploration Limited and Caribou Chaleur Bay Mines Ltd., which constitute the Caribou property. A decision was made in 1987 to proceed with the construction of a 2000 t/d mine/mill that would produce a lead-zinc bulk concentrate suitable for feedstock to an Imperial Smelting Furnace. Work on the mill was commenced in the latter part of 1987.

RESERVES 5 428 000 t of proven and probable ore grading 8.77% Zn, 3.91% Pb, 113.25 g/t Ag, and 1.66 g/t Au, plus an additional 5 500 000 t of

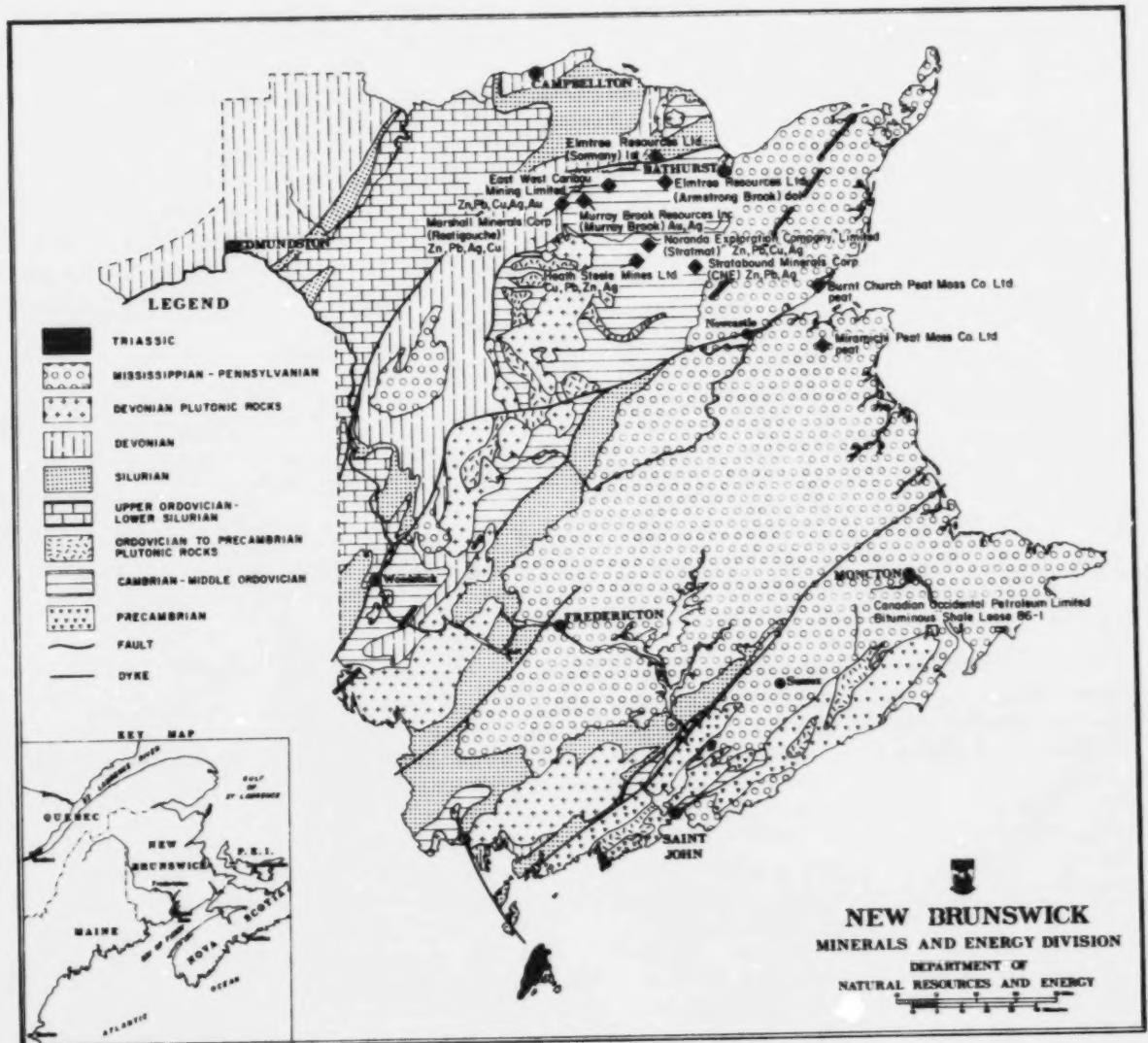


Figure 19. Mine properties in development stage in New Brunswick in 1988.

possible ore grading 8.37% Zn, 3.59% Pb, 101.76 g/t Ag, and 1.78 g/t Au.

PRODUCTION Secondary copper ore (825 552 t) was extracted from the open pit between November, 1970 and September, 1974. The average grade was 3.4% Cu.

DEVELOPMENTS Development of the property began late in 1987 with work progressing well until the early part of 1988, when it became apparent that required equity financing for the project would not be forthcoming through the normal means. A concerted effort was begun by both the provincial government and company representatives to find other sources of financing for this portion of the project. A suitable investor was found and the required financing put into place after the Province of New Brunswick agreed to supply a loan guarantee, in the event that Caribou could not repay the investment. This action then opened the way for Caribou to acquire suitable debt financing for the remainder of the development. The delay in acquiring the needed financing deferred the start up date by approximately four months.

Caribou has completed the building of a dam for the tailings pond, carried out extensive underground definition drilling for mine layout, initiated stope development and completed the expansion of the existing mill (Figure 20). A public meeting was held in December 1987 concerning the environmental aspects of the proposed operation and the reclamation plan received approval in October, 1988. On October 28, 1988 Caribou New Brunswick Mining received its Mining Lease, and subsequently changed its name to East West Caribou Mining Limited. Mill start-up has been initiated and it is expected that the first bulk concentrate will be shipped out of the port of Belledune during the first week of February 1989.

Heath Steele Mines Limited (Heath Steele)

21 0/8W

LOCATION The Heath Steele mine is located 51 km northeast of Newcastle in Northumberland County (Figure 19). (Lat. 47°17'N; Long. 66°05'W)

RIGHTS In 1988, Heath Steele Mines Limited held Mining Lease 238 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY The mine operates under the name Heath Steele Mines Limited with head offices at P.O. Box 45, Commerce Court West, Toronto, Ontario M5L 1B6. The mine office address is P.O. Box 400, Newcastle, New Brunswick E1V 3M5. The President is J.C. White; the Senior Vice-President is J.W. Moerman and the Project Superintendant is D. Archibald.

HISTORY The Heath Steele deposit was discovered in 1954 by airborne electromagnetic surveying. Mining began in 1957 but was suspended between 1958 and 1962 because of low metal prices and poor recoveries. The mine reopened in 1962 with a contract to treat the ore from Cominco's Wedge mine. In 1968, the mine began operating under the name Little River Joint Venture, managed and owned by AMAX (75%) and INCO (25%). In 1979, Noranda Exploration Company, Limited acquired AMAX's 75% share and ASARCO acquired INCO's 25% share.

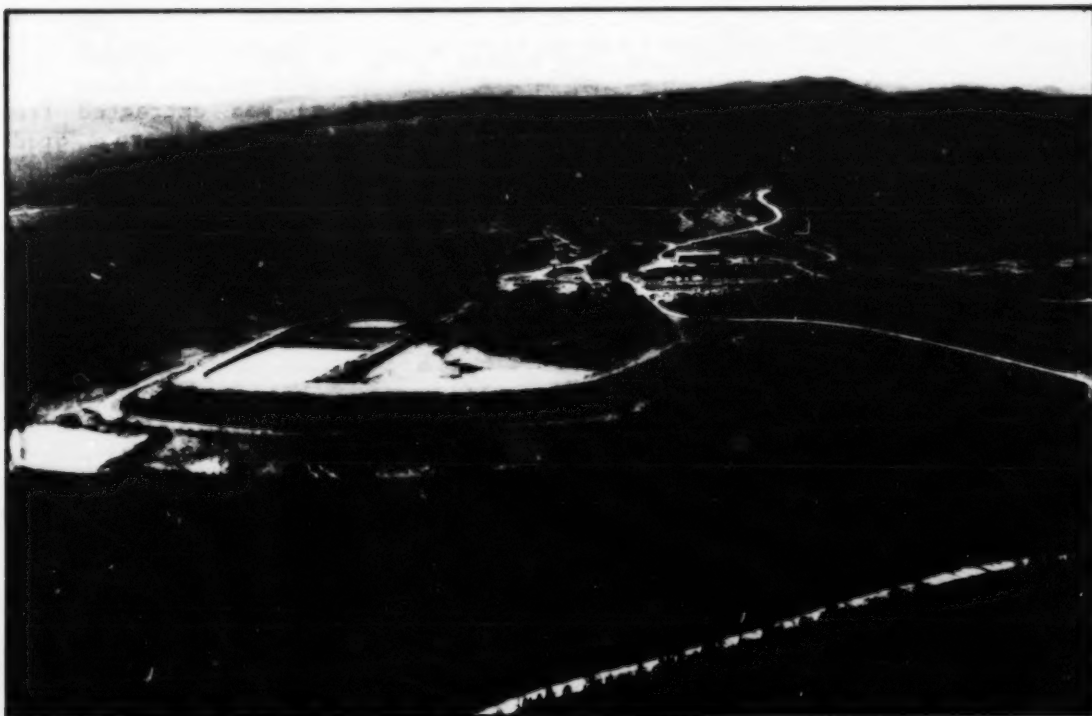


Figure 20. Aerial view of the East West Caribou Mining Limited mine site (Caribou deposit).

On April 29, 1983 sulphide operations ceased due to low metal prices and diminished revenues. The plant was converted to treat gossan ores in order to recover gold and silver. This cyanide treatment process started in July 1983. After some start-up problems, the plant operated well, treating a peak of 517 t/d. The gossan operations continued until October 1984.

In 1986 Brunswick Mining and Smelting Corporation Limited acquired ASARCO's 25% share in the mine.

RESERVES Mineral Inventory (December, 1986) indicated reserves of 15 177 200 t of ore grading 1.24% Cu, 1.63% Pb, 5.03% Zn, 60.34 g/t Ag, and 0.62 g/t Au.

DEVELOPMENTS Heath Steele Mines Limited completed the Stratmat exploration program during 1988 and followed that with a feasibility study on the economics of reopening the Heath Steele property. Extensive work was carried out on the Stratmat deposit following the completion of a 2438 m (8000 foot) exploratory decline. This included considerable underground drilling for deposit definition, followed by bulk sampling for metallurgical testing, as well as the development of a 13 600 t test stope to study potential ground conditions. The feasibility study for the project was completed at the end of 1988, which was followed by an application to the New Brunswick Department of Municipal Affairs and Environment for

Environmental Impact Assessment (EIA) screening. It is expected that the Boards of both Brunswick Mining and Smelting Corporation Limited and Noranda Exploration Company, Limited will be approached early in the new year for approval.

If the decision is positive, it is expected that the mine/mill will operate at a rate of 2200 t/d and employ approximately 220 people. Capital expenditure would be in the range of \$25 000 000. The project would operate using ore from various combinations of known deposits including the Stratmat and it can be expected that the mine would operate for a minimum of five years.

EMPLOYEES An average of 30 regular and 35 contract employees on site.

Marshall Minerals Corp. (Restigouche)

21 0/7, 10

LOCATION The Restigouche zinc, lead, silver, copper deposit is located on the Road to Resources, about 70 km west of Bathurst in Restigouche County (Figure 19). (Lat. 47°30.2'N; Long. 66°33.5'W)

RIGHTS In 1988, Marshall Minerals Corp. held Mining Licence 1237 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY Marshall Minerals Corp. The head office is Suite 404, 357 Bay St., Toronto, Ontario M5H 2T7. The Chairman is H.G. Quint and the President is N. Brewster.

HISTORY The property was initially staked by Selco in 1954 because of strong base-metal anomalies in streams draining the area. The property was optioned to New Jersey Zinc Company in 1957 who discovered the sulphide deposit by drilling a strong soil-geochemical anomaly. Tech Corporation (Keevil Mining Group) optioned the property in 1965. After several drill holes and metallurgical tests, Tech dropped its option in 1970. In 1972, the property was optioned to Gowganda Silver Mines who turned over its interest to Placer Development in 1974. In 1980, Placer optioned this deposit to Billiton who completed 11 278 m of drilling and then dropped it in 1983. Extensive geological, geophysical, and geochemical studies were carried out and the extensive drilling added 90 720 t to the ore reserves. In 1985, Lincoln Resources optioned the property. The property was optioned by Southwind Resources in 1986. Marshall Minerals acquired the rights to the property from Placer-Dome Inc. in 1988.

GEOLOGY The host rock is Ordovician sericite-chlorite and chlorite-sericite schist that overlies interbedded metaquartzite and metagreywacke. Conformable lenses of banded, massive to disseminated, fine-grained pyrite-sphalerite-galena-chalcopyrite-minor tetrahedrite plunge approximately 17° to the north-northwest. This zone is 490 m long and averages 90 m wide and 30 m thick. Mineralization outcrops to the south and has been traced to a vertical depth of 183 m to the north. Minor folds are common, and the host rock is chloritized adjacent to the mineralization.

RESERVES Marshall Minerals Corp. reported total reserves of

1 570 000 t grading 0.35% Cu, 5.36% Pb, 6.94% Zn, 112.1 g/t Ag, and 1.2 g/t Au. This includes 1 040 000 t of open-pit reserves grading 0.38% Cu, 5.96% Pb, 7.71% Zn, 124.1 g/t Ag, and 1.37 g/t Au using a 6% combined lead-zinc cutoff.

DEVELOPMENTS To date, Marshall Minerals Corp. has performed drill coring for metallurgical ore testing and has embarked on extensive definition drilling of the deposit. No definite production plans are in place at this time; however, it is expected that in 1989 a decision will be made concerning the development of the deposit.

Murray Brook Resources Inc. (Murray Brook)

21 0/9W

LOCATION The Murray Brook gold, copper, zinc, lead deposit is located approximately 60 km west-southwest of Bathurst in Restigouche County (Figure 19). (Lat. 47°31.5'; Long. 66°25.8') It is accessible via Highway 180 and a newly built access road.

RIGHTS In 1988, Murray Brook Resources Inc. held Mining Licence 1180 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY The Murray Brook Project is owned and operated by Murray Brook Resources Inc., whose parent company is NovaGold Resources Inc. This present situation is the result of a merger in late 1988 between Northumberland Mines Ltd., the previous owner of the property, and NovaGold Resources Ltd.

The head office for NovaGold Resources Inc. is: Second Floor, 1583 Hollis St., Halifax, Nova Scotia, B3J 1V4. The President is Mr. Gerald J. McConnell and the Vice-President of Canadian Operations is Dr. William L. Young, P. Eng.

HISTORY The deposit was discovered in 1956 by Kennco Explorations (Canada) Limited by tracing a stream-sediment anomaly to source, in claims that had been previously staked over airborne geophysical anomalies. The property was subsequently optioned to a number of companies including Cominco Ltd., Gowganda Silver Mines Ltd., Canex Placer, and Northumberland Mines Ltd. Northumberland, primarily interested in the precious-metal content of the gossan, submitted a feasibility report, including a reclamation plan, in late 1986. Both of these were subsequently approved by the appropriate provincial government agencies, thus permitting Northumberland to proceed with the initial stages of mine development on the Murray Brook site. In 1988, Northumberland Mines Limited and the Murray Brook deposit were acquired by NovaGold Resources Inc.

GEOLOGY The deposit consists of a large low-grade massive sulphide body that is capped by a thick blanket of pre-Pleistocene gossan. Chloritic and calcareous mudstones (phyllites) are spatially associated with the sulphides - predominantly pyrite, sphalerite, chalcopryrite, galena, and arsenopyrite. The deposit sits within a sedimentary unit (dominantly phyllite), that is sandwiched between mafic volcanic rocks to the north and felsic volcanic rocks to the south, all of which belong to the Ordovician Tetagouche Group.

RESERVES A preliminary pit evaluation programme indicates a mineral reserve of 1 690 000 t of gossan grading approximately 1.27 g/t Au and 51.0 g/t Ag.

DEVELOPMENTS As was common with other smaller operators in the mineral industry, raising of capital for development proved to be difficult after the October 19, 1987 stock market incident. As a result, Northumberland has chosen to join with NovaGold Resources Ltd., a Nova Scotia-based resource company with holdings in Nova Scotia, New Brunswick, Nevada, and New Mexico.

NovaGold received federal loan guarantees through the Atlantic Canada Opportunities Agency as well as interim financing from the Province of New Brunswick. It is understood that the required equity financing has been put into place through a \$2 000 000 limited partnership offering and development of the project will recommence in March of 1989.

The project has an approved reclamation programme and has submitted a revised feasibility plan as part of their application for a Mining Lease. Work was undertaken during 1988 to upgrade roads into the property as well as some preparatory work on the site itself to facilitate construction. It can be expected that production will take place in the latter part of 1989.

The proposed operation will be a 1000 t/d open pit mine, utilizing a vat-leaching process to extract the precious metals from the crushed and agglomerated ore. Reserves would indicate a mine life of approximately 5 to 6 years, employing 25 to 30 people.

Noranda Exploration Company, Limited (Stratmat)

21 0/8E

LOCATION The Stratmat boundary deposit (west zone) is located approximately 5 km northwest of the Heath Steele mill complex and about 50 km southwest of Bathurst in Northumberland County (Figure 19). (Lat. 47°13'N; Long. 66°07'W)

RIGHTS In 1988, Noranda Exploration Company, Limited held 56 mineral claims (Stratmat boundary deposit) under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY Noranda Exploration Company, Limited, P.O. Box 30, Bathurst, N.B. E2A 3Z1.

HISTORY The Stratmat main (east) zone was discovered by Strategic Metals in 1956 following geophysical surveys. The company drilled holes 61-1 to 61-36 in 1956-57, then optioned the property to Cominco Limited in 1959. Exploration by Cominco led to the discovery of the boundary deposit (West Zone) in 1961, and the stringer and central zones in 1972. The Stratmat north zone was discovered in 1980 following the drilling of geophysical anomalies. The boundary deposit lies on the boundary between the Heath Steele and Cominco properties.

Mineral dressing tests carried out at Heath Steele in 1982 were very successful. In 1987, R.R. Irrinki of the New Brunswick Department of

Natural Resources and Energy, Geological Surveys Branch, completed an ore reserve estimation for the property. In 1986, the boundary deposit was drilled by Brunswick Mining and Smelting Corporation Limited to obtain metallurgical samples. Preliminary results indicated good grade zinc, lead, and silver, and excellent recoveries.

In August, 1986, ownership was transferred from Cominco Limited to Noranda Exploration Company, Limited as operator of the property.

GEOLOGY The Stratmat deposit comprises five sulphide zones: Stratmat main zone, Stratmat central zone, boundary deposit (west and east lenses), Stratmat north zone, and stringer zone. The nearby N-5 zone is closely related to the boundary deposit, but is owned by Heath Steele Mines Limited.

Banded massive sulphides occur as boudins and dismembered layers within a high-strain zone in metasedimentary host rocks. Disseminated sulphides occur in the tectonized and illitized metasediments between the boudins.

The massive sulphides consist of fine- to medium-grained inter-banded sphalerite-galena and pyrite, with local coarse-grained chalcopryite. Vaguely banded pyrite-chalcopryite occurs locally. Disseminated sulphides include medium-grained pyrite and/or sphalerite with smaller amounts of galena and chalcopryite. The sulphide deposits and the metasediments are sandwiched between two polydeformed sequences of felsic crystal and lapilli tuffs ("Southwall and Northwall sequences"). One large gabbro dyke and several diabase dykes cut the supracrustal rocks of the Stratmat east zone. All rocks are thought to be Middle Ordovician in age (Tetagouche Group). The shapes and attitudes of the sulphide-bearing zones are controlled by two sets of folds.

RESERVES (Geological) Total for main zone (Noranda Exploration Company, Limited report, 1988): *834 839 t grading 2.68% Pb, 6.39% Zn, 0.28% Cu, 69.48 g/t Ag; separate Cu reserve for Main Zone (Noranda Exploration Company, Limited report, 1988): *175 183 t grading 0.06% Pb, 0.37% Zn, 2.79% Cu, 16.31 g/t Ag; total for boundary deposit (Noranda Exploration Company, Limited report, 1987): *1 723 641 t grading 3.45% Pb, 8.20% Zn, 0.35% Cu, 41.92 g/t Ag; central zone (Cominco estimate): 200 000 t grading 4.30% Pb, 8.00% Zn, 0.50% Cu; north zone: N/A; stringer zone (Cominco Limited estimate): 180 000 t grading 2% Cu.

DEVELOPMENTS A production decision was reached in early 1989 to re-open the Heath Steele mine. A portion of the mill feed will originate from the open pit and underground workings of the boundary deposit.

* includes 5% dilution at nil grade

Stratabound Minerals Corp. (CNE)

21 0/8W

LOCATION The Captain North Extension (CNE) zinc, lead, silver deposit is 14 km east of the Heath Steele mine, just east of the Northumberland-Gloucester county line and about 1.5 km north-northwest of the Captain deposit (Figure 19). (Lat. 47°17.7' and Long. 65°53.2') It is accessible via Hwy. 430 and secondary roads.

RIGHTS Mineral claims are held by Norman Pitre, Bathurst, N.B., under the Mining Act, Chapter M-14.1, R.S.N.B. 1986. The property has been optioned by Stratabound Minerals Corp.

COMPANY Stratabound Minerals Corp. The head office is at Suite 518, Tri Ocean Place, 222-58th Ave. SW, Calgary, Alberta T2H 2S3. Mr. S.J. Stricker is president and Mr. K.D.A. Whaley is vice-president in charge of exploration.

HISTORY The CNE deposit was found by Sabina Industries in 1978 as a result of stream-silt and soil (organic) geochemical surveys. Sixteen holes were drilled but only two intersected significant lead-zinc mineralization. The property was dropped in 1983 and acquired by Billiton but they did no further drilling. In 1986 the property was staked by N. Pitre who optioned it to Noranda Exploration the following year. After drilling nine holes in 1987 and two in 1988, Noranda concluded that the CNE deposit is too small to warrant further investigation. Subsequently, the property was optioned to Stratabound Minerals Corp.

GEOLOGY The CNE deposit is situated within a northerly trending sequence of sedimentary and felsic volcanic rocks that comprise part of the Ordovician Tetagouche Group. Lithologically, these rocks are very similar to those in the vicinity of the Brunswick massive sulphide deposits, i.e., siltstones, quartz augen schists, quartz-feldspar augen schists, and massive rhyolites.

According to Whaley (Stratabound Minerals Corp. Annual Report, 1988), the massive sulphides occur in two lenses that constitute part of a refolded synform. The lenses have a northerly strike and a vertical to west 60° dip. Two copper-rich zones occur in the easterly or "A lense" and there is another one along the east side of the "B lense." The sulphides are coarse grained and composed dominantly of sphalerite, pyrite and galena with minor arsenopyrite and trace amounts of chalcopyrite, cassiterite, and argentiferous tetrahedrite.

RESERVES Drill-indicated reserves, using a cut-off grade of 6% combined lead and zinc, are 190 500 t with 172 350 t of "probable ore" grading 7.59% Zn, 2.94% Pb, and 100.8 g/t Ag plus another 18 150 t of "possible ore" (Stratabound Minerals Corp. Annual Report, 1988).

DEVELOPMENTS Trenching of an IP target in October 1988, followed by drilling in late 1988 (14 holes) and early 1989 (10 holes) resulted in the delineation of an open-pittable reserve of massive sulphides. The company proposes to mine and custom mill this deposit at a rate of 485 t/d.

NONMETALLIC MINERALS^{13,14}

PEAT¹³

Two peat moss companies were in a development stage in 1988: Burnt Church Peat Moss Co. Ltd. and Miramichi Peat Moss Co. Ltd. (Figure 19).

Burnt Church Peat Moss Co. Ltd.

COMPANY Burnt Church Peat Moss Co. Ltd., P.O. Box 70, Shippagan, New Brunswick EOB 2P0. Telephone: (506) 336-2325. The contact person is René Martin.

RIGHTS Peat Moss Lease No. 22 (202 ha) on Bog 353, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 353 is located 3 km southwest of Burnt Church, Northumberland County (Figure 19).

HISTORY The company acquired a Peat Exploration Licence in 1981 and converted to a Peat Moss Lease in 1983. Fafard Peat Moss Co. Ltd. acquired the assets of the company in 1988.

RESERVES AND GRADE 9.26 Mm³ of surficial peat and 1.06 Mm³ of humified peat on total bog area as follows:

	<u>Bog (total)</u>	<u>>1 m</u>
Crown (ha)	90	67
Freehold (ha)	237	188
Total (ha)	327	255

DEVELOPMENT Site preparation and construction of building.

Miramichi Peat Moss Co. Ltd.

COMPANY Miramichi Peat Moss Co. Ltd., P.O. Box 240, Lamèque, N.B. EOB 1V0. Telephone: (506) 344-2225. The contact person is Gilles Haché.

RIGHTS Peat Moss Lease No. 31 (770 ha) on Bog 3, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 3 is located 10 km south of Bay du Vin. Access is by an upgraded woods road from Highway 11, near St. Margarets (Figure 19).

HISTORY Acadian Peat Moss (1979) Ltd. applied for a Peat Exploration Licence in 1986. A licence was issued in 1987. A Peat Lease was granted in 1988 to a newly formed subsidiary company, Miramichi Peat Moss Co. Ltd.

RESERVES AND GRADE 10.12 Mm³ surficial peat and 2.86 Mm³ humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	564	323
Freehold (ha)	3	0
Total (ha)	567	323

DEVELOPMENT Site preparation and road upgrading.

LIMESTONE/DOLOMITE¹⁴

Elmtree Resources Ltd. (Sormany Limestone)

21 0/9

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 84.3 ha Quarry Lease No. 27 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

171.3 ha Mining Lease No. 248 and 16.2 ha Claim Block 993 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION This deposit is located about 30 km west of Bathurst, adjacent to the Millstream River (Figure 19).

HISTORY Although the limestones near Sormany were mapped by Davies in 1959, it was not until 1982 that Elmtree Resources Ltd. mapped and sampled the deposit in detail. Two holes were drilled to further test the extent and grade continuity of the limestone at depth. Results were encouraging enough to proceed with site preparation for quarry development.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADES Initial exploration results indicated an excess of 4 000 000 t of high-grade calcic limestone (53.0% CaO) suitable for quicklime and hydrated lime production.

PRODUCTION Some stone has been quarried and hauled to the main crushing facility at Elmtree, where it has been marketed as agricultural (ag) lime and smelter flux (see Armstrong Brook dolomite, below).

DEVELOPMENT In 1988, some stone was hauled to the crushing facility at Elmtree where it was marketed as ag lime and various other products.

EMPLOYEES Manpower was provided by the staff of Elmtree Resources Ltd.

Elmtree Resources Ltd. (Armstrong Brook Dolomite)

21 P/12W

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 59.10 ha Quarry Lease No. 26 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

161.1 ha Mining Lease No. 247, under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION This dolomite deposit is located about 22 km west of Bathurst, Gloucester County (Figure 19).

HISTORY The deposit was found several years, perhaps decades, ago. It appears to have been used by local farmers, since the ruins of old kilns are present in the area. The deposit was rediscovered by Anaconda geologists in the 1950s while exploring for sulphide deposits. It was briefly investigated by J.W. McCarthy in the early 1970s and staked by Elmtree Resources Ltd. in 1982. An access road was constructed in 1983 and limited production for testing purposes was undertaken.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Exploration and development work by Elmtree Resources Ltd. has resulted in the delineation of more than 2 000 000 t of dolomite grading up to 37% MgCO₃.

PRODUCTION None.

DEVELOPMENT Plans to install additional crushing equipment for production of dolomitic ag lime and construction stone have been delayed.

EMPLOYEES Manpower was provided by the staff of Elmtree Resources Ltd.

ENERGY RESOURCES

OIL SHALE²²

Canadian Occidental Petroleum Limited

21 H/15E

COMPANY Canadian Occidental Petroleum Limited, 1500, 635-8th Avenue S.W., Calgary, Alberta T2P 3Z1. Telephone: (403) 234-6700. The President is J. Angus McKee and the General Manager (oil shales) is E. Yildirim.

RIGHTS The company retains a 1439 ha Bituminous Shale Lease L74-01 under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION The lease area lies in the Albert Mines area about 25 km south-southeast of Moncton in Albert County (Figure 19).

HISTORY Bituminous shale was first reported at Albert Mines by Dr. Abraham Gesner in 1841. The area is best known for the solid hydrocarbon (albertite) vein that was discovered there by John Duffy in 1851. The vein was mined out between 1852 and 1880.

The importance of the oil shales first gained attention between 1854 and 1856 when Dr. Gesner retorted a burning oil from them. Following the closure of the albertite mine in 1880, the area attracted little interest until 1902 when R.W. Ellis of the Canada Department of Mines drilled 36 shallow core holes near the old mine. In 1968, the Atlantic Richfield Company Limited drilled two holes at Albert Mines. One of these holes assayed 63 L/t shale oil over 130 m.

PRESENT OWNERSHIP Canadian Occidental Petroleum Limited is a public company, with 48% ownership by Occidental Petroleum Limited and 52% by shareholders.

RESERVES AND GRADES In 1942, the Canada Department of Mines estimated that there were 90 900 000 t of oil shale averaging 44 L/t, yielding about 47 700 m³ (300,000 barrels) of shale oil to a depth of 120 m. In 1982, the Geological Survey of Canada and the New Brunswick Department of Natural Resources estimated that there were about 42 925 000 m³ (270,000,000 barrels) of oil in situ to a depth of 600 m.

EXPLORATION In 1974, Canadian Occidental Petroleum Limited acquired the rights to the Albert Mines area by means of a Bituminous Shale Licence to Search covering 404 700 ha in southeastern New Brunswick. They converted this licence in 1981 to a development permit of about 29 138 ha. Between 1974 and 1981 nine core holes were drilled and a high-grade oil shale zone was partially delineated. In 1983, the permit area was reduced to 1439 ha. In 1986, the development permit was converted to a Bituminous Shale Lease.

In 1986, Canadian Occidental completed a resource evaluation study which began in 1984. This evaluation provided the basis for a mine evaluation plan for the Albert Mines site. A general plan for large-scale mining and a plan for excavating 40 000 to 50 000 t of shale from a small test pit have been submitted. The test pit sample was provided to the New Brunswick Electric Power Commission to run in their Chatham circulating fluidized-bed cocombustion demonstration plant in 1986.

In the past, Canadian Occidental has provided several tonnes of oil shale to Umatac Industrial Processes of Alberta, Lurgi GmbH of Germany, and the New Brunswick Electric Power Commission. The samples will provide additional data on retorting and fluidized-bed combustion characteristics of Albert Mines oil shale.

DEVELOPMENTS In 1988, calcium analyses were run on drill core and a bulk sample was taken for retort testing. The retort tests will be carried out in Brazil by the national oil company Petrobra's Petroleo Brasileiro S.A. and in New Brunswick by the Research and Productivity Council.



CHAPTER 4. PRODUCING MINES AND QUARRIES IN NEW BRUNSWICK

VALUE OF PRODUCTION¹⁷

The Province of New Brunswick has realized a significant increase in mineral value over 1987 values. The total value of minerals produced during 1988 was \$831 055 000, up approximately 34% over the final figure for 1987 (Table 2 and Figure 21). The major contributing factors for this increase are improved metal and potash prices and overall improved production from New Brunswick's operating mines.

Metal production makes up the majority of mineral value in the Province, with this year's total being \$545 957 000 or 66% of total mineral production (Table 3). Of the metals, the most notable improvements were in zinc which rose in value to \$379 016 000 and represents 45% of the total value of minerals produced. Zinc prices ranged from a low of \$0.44 US to a high of \$0.77 US per pound for 1988, an increase in value of 75%.

Lead is the second most valuable metal produced in the Province at a value of \$73 289 000. This represents a marginal increase in value over 1987, even though production of lead increased significantly over the same period. Silver experienced a similar fate with its value actually down from the previous year while production was up markedly. The metal making the most significant gains in both value and production was copper, with an overall increase in value from the preceding year of 76%; it contributed over \$30 000 000 to the Province's mineral value.

Antimony (\$7 276 000), bismuth (\$2 770 000), cadmium (\$1 590 000), and gold (\$1 273 000) all contributed significantly to New Brunswick's overall metal output and it is worth noting that cadmium, while not increasing in quantity over 1987, increased its value to the Province by 225%. This exemplifies the extreme changes that can occur in the metals market when demand exceeds supply.

Of the nonmetals produced in the Province, potash by far is the major contributor, experiencing an increase in value of 49% over last year. This increase can be directly attributed to higher prices and increased production from the Sussex area mines. Peat and sulphur (from smelter gas) contribute significantly to New Brunswick's mineral industry while gypsum, salt, and silica contribute less. Nonmetals represent 25% of the value of mineral production and have a total value of \$205 124 000.

Fuels contributed \$33 907 000 (about 4%) to the total value of production. Coal is by far the major contributor to this figure; however, oil and natural gas are still producing on a regular basis in New Brunswick.

Structural materials, consisting of cement, clay products, lime, sand and gravel, and stone, were valued at \$46 067 000 for 1988. These materials literally provide the construction basis for industry to grow in the Province.

New Brunswick has an excellent representation of producing metals, minerals and commodities and is, in fact, a national leader in the production of antimony and bismuth (Table 4). As well, it is second in the production of peat and potash, and third in zinc, lead, and sulphur (in smelter gas).

EMPLOYMENT¹⁷

Employment in the mineral industry was up significantly from the previous year, from an average total of 4345 in 1987 to 4736 in 1988. This improvement can be attributed mainly to the dramatic increase in mineral prices over the year, which resulted in new projects being developed as well as existing operations being upgraded.

The following gives employment by sector in the mineral industry for 1988: Metals - 2607; Potash - 863; Coal - 213; Peat - 924; Structural Materials - 131.

Scientific, technical, administrative, and casual personnel employed by the Province in support of mineral resource development totalled 63 for 1988.

TABLE 2. MINERAL PRODUCTION IN NEW BRUNSWICK
1978 to 1988
(Compiled from Energy, Mines and Resources statistics)

Calendar Year	Metals (\$)	Nonmetals (\$)	Fuels (\$)	Structural Materials (\$)	Total (\$)
1978	281 770 379	11 467 716	8 811 135	37 670 743	339 719 973
1979	419 123 591	11 658 369	10 394 844	38 510 412	479 687 216
1980	302 674 000	13 192 293	17 282 186	40 981 000	374 129 479
1981	452 580 000	16 666 976	23 325 535	39 769 000	532 341 511
1982	409 832 000	20 587 126	24 630 614	43 241 000	498 290 740
1983	421 281 000	19 220 800	29 707 000	38 385 000	508 593 800
1984	497 981 000	47 973 438	29 837 000	42 178 000	617 969 438
1985	364 825 000	62 025 000	31 626 000	43 727 000	502 203 000
1986	312 466 000	118 813 000	28 027 000	42 264 000	501 570 000
1987	391 836 000	152 481 000	33 347 000	44 567 000	622 231 000
1988(P)	545 957 000	205 124 000	33 907 000	46 067 000	831 055 000

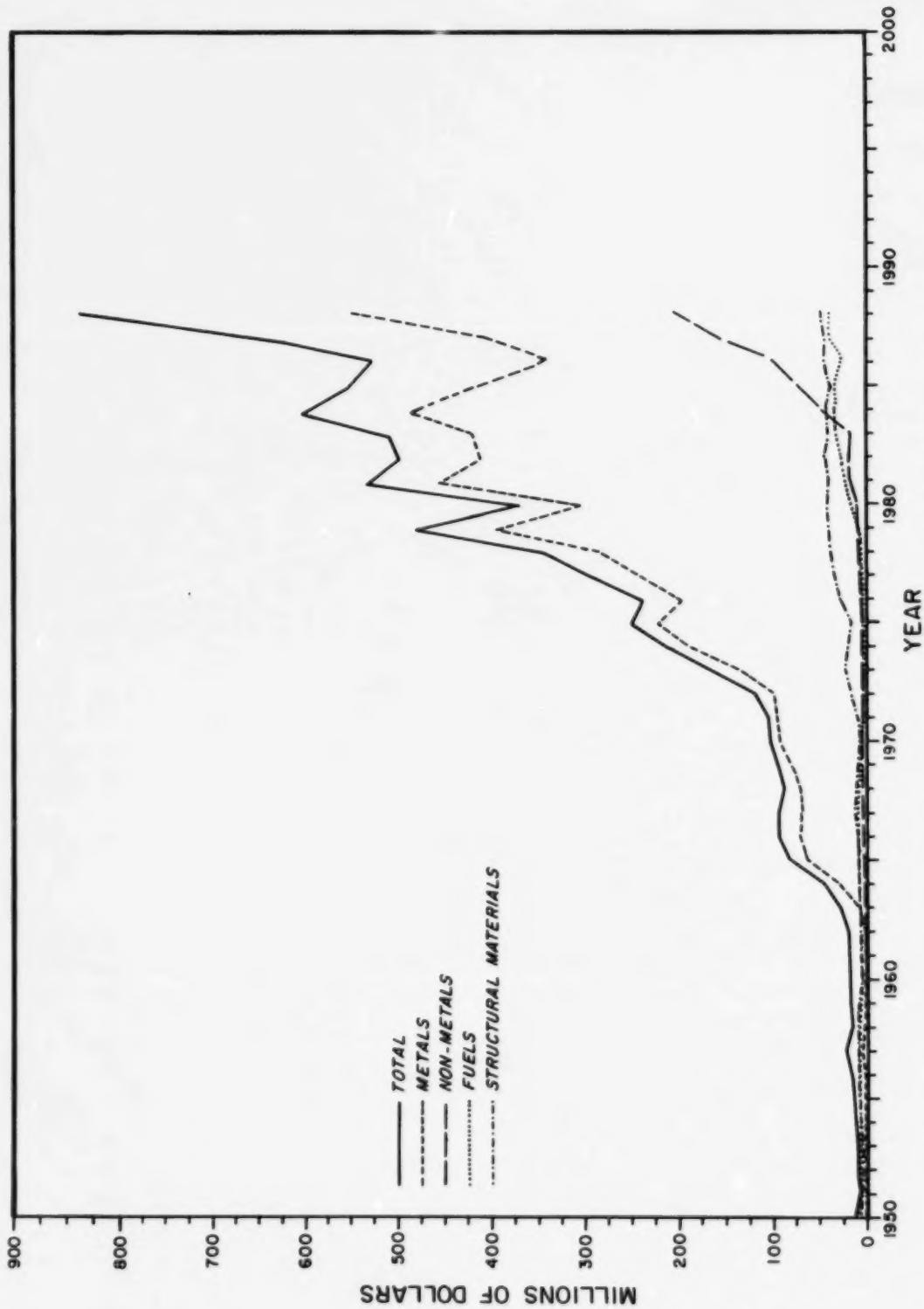


Figure 21. Value of mineral production in New Brunswick, 1950-1988.

TABLE 3. MINERAL PRODUCTION IN NEW BRUNSWICK, 1988
(Compiled from Energy, Mines and Resources statistics)

<u>Preliminary Estimate</u>			
<u>METALS</u>	Units	Quantity	Value (\$)
Antimony	kg	---	7 276 000
Bismuth	kg	180 000	2 770 000
Cadmium	kg	84 000	1 590 000
Copper	kg	9 607 000	30 847 000
Gold	g	74 000	1 273 000
Lead	kg	73 289 000	73 289 000
Silver	kg	202 000	49 896 000
Zinc	kg	230 125 000	<u>379 016 000</u>
TOTAL			545 957 000
<u>NONMETALS</u>			
Gypsum	t	---	19 000
Peat	t	214 000	18 292 000
Potash	t	---	---
Silica*	t	---	---
Salt	t	---	---
Sulphur (in smelter gas)	t	94 000	<u>10 616 000</u>
TOTAL			205 124 000
<u>FUELS</u>			
Coal	t	545 000	33 880 000
Natural Gas	m ³	1 000 000	14 000
Petroleum Crude	m ³	---	<u>13 000</u>
TOTAL			33 907 000
<u>STRUCTURAL MATERIALS</u>			
Clay products		---	2 975 000
Cement		---	4 085 000
Lime**		---	---
Sand and Gravel	t	10 300 000	---
Stone	t	2 960 000	<u>16 280 000</u>
TOTAL			46 067 000
GRAND TOTAL 1988, Preliminary (CDN \$)			<u>\$831 055 000</u>
GRAND TOTAL 1987 (CDN \$)			<u>\$622 231 000</u>

* Formerly reported as "Quartz"

** Includes all limestone products except aggregate

TABLE 4. RANK OF PROVINCES AND TERRITORIES, IN VALUE OF PRODUCTION
FOR LEADING MINERALS IN CANADA, 1988 (P)
(Compiled from Energy, Mines and Resources statistics)

Mineral	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Total Value Canada (\$ millions)
Petroleum, Crude													\$9 349 519
Natural Gas													4 973 307
Gold	x												2 215 128
Copper		x											2 317 018
Zinc		x											2 064 647
Coal			3	5									1 907 800
Cement			5	9									1 012 625
Sand and Gravel			5	5									782 675
Potash				x									1/058 716
Stone			4	5									601 312
Lead				2									333 707
Silver			x	4									378 136
Salt			x	x									257 518
Lime			x	x									189 946
Clay Products			5	7									185 273
Gypsum			1	6									87 674
Sulphur			8	3									73 615
(in Smelter Gas)													
Peat			x	2									70 562
Quartz			x	x									46 997
Antimony				1									8 411
Cadmium				6									32 813
Bismuth				1									3 016
Marl				x									x

X - Confidential information under the Statistics Act.

METALLIC MINERALS¹⁷

Brunswick Mining and Smelting Corporation Limited

21 P/5W

Brunswick operates one mine (No. 12), a concentrator, a lead smelter, and a fertilizer plant.

LOCATION: The Brunswick No. 12 mine is located about 24 km west of Bathurst in Gloucester County (Lat. 47°28.5'N and Long. 65°53.5'W). The concentrator is adjacent to the No. 12 mine (Figure 22). The lead smelter is located at Belledune Point, about 45 km from the No. 12 mine.

RIGHTS In 1962, Brunswick Mining and Smelting Corporation Limited was granted surface and mineral rights to the No. 12 mine property.

COMPANY Head Office - P.O. Box 45, Commerce Court W., Toronto; Mine Office - P.O. Box 3000, Bathurst; Smelter Officer - P.O. Box 2000, Belledune. The President is J.C. White; Senior Vice-President is J.W. Moerman; Manager of the Mining Division is J.R. Schnarr; General Manager of the Smelter and Fertilizer Division is A.B. Neil.

HISTORY: Sulphides were noted in 1907; however, drilling of ground electromagnetic targets in 1952 located the No. 6 mine. Investigation of another electromagnetic anomaly on strike pin-pointed the site of the No. 12 mine in 1953. The property was granted to Brunswick Mining and Smelting Corporation Limited, which was controlled at that time by St. Joseph's Lead Company. During the period 1953-57, an open pit and pilot mill were constructed at the No. 6 location. In 1961, interest was transferred to M.J. Boylen, K.C. Irving, and Patino Corporation. Development commenced at No. 12 in 1962 and mine production began in 1964. Production began at No. 6 mine in 1966. In 1967, Noranda invested \$50 000 000 and gained control of Brunswick Mining and Smelting Corporation Limited. Noranda proposed a \$50 000 000 expansion, which was started in 1974 and completed in 1981. A total capital expenditure of \$69 000 000 was made at the mine and smelter between 1979 and 1981.

In 1985, the adjoining Belledune fertilizer plant, which produces a diammonium phosphate fertilizer product using sulphuric acid produced by the smelter, was purchased by Brunswick Mining and Smelting Corporation Limited. In 1986, Brunswick Mining began deepening its No. 3 shaft to 244 m.

EMPLOYEES The number of employees was 1448, a reduction of 50 from the previous year.

RESERVES 92 888 000 t of ore grading 0.31% Cu, 3.57% Pb, 8.87% Zn, and 101.2 g/t Ag (December, 1987).

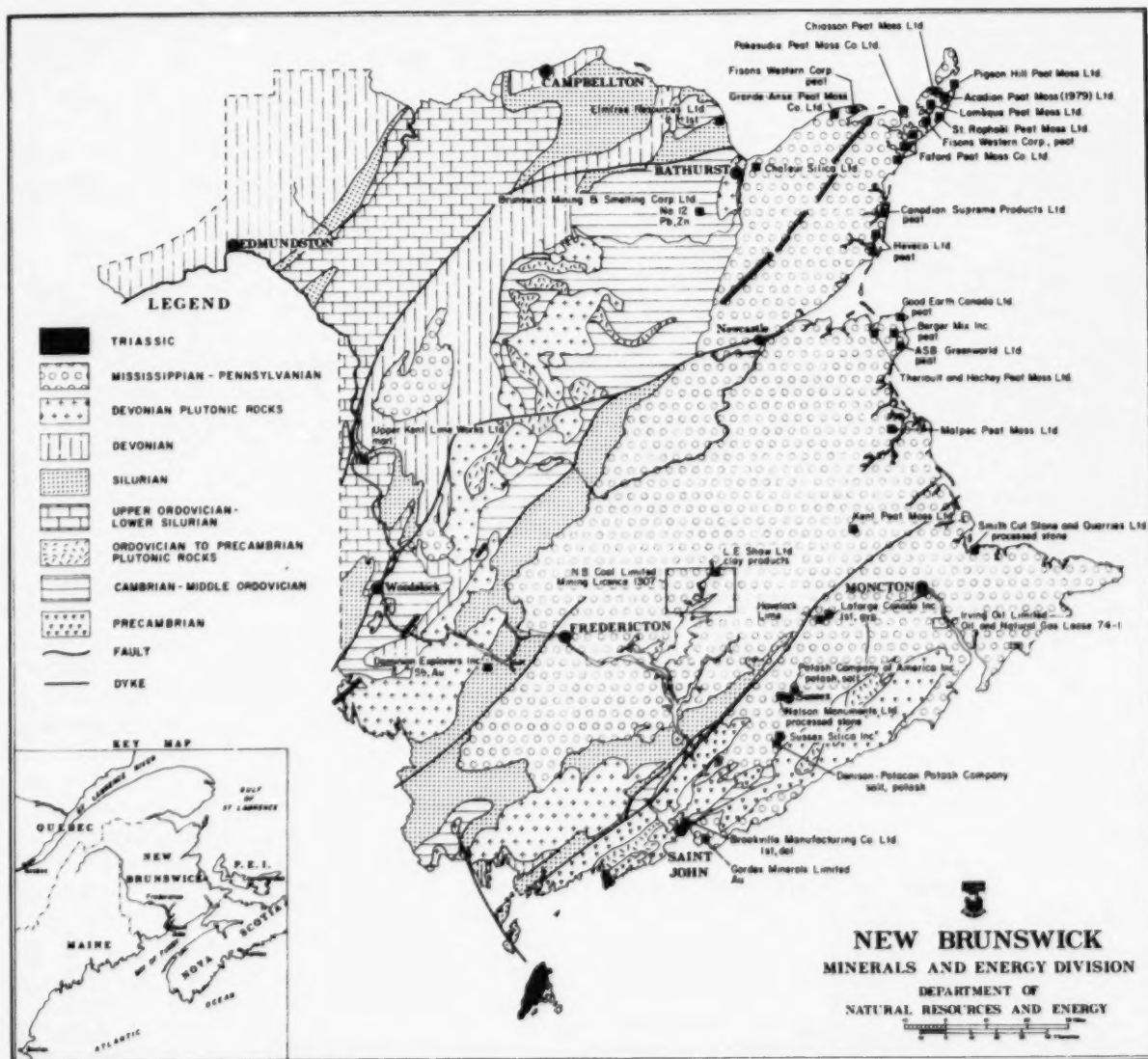


Figure 22. Nonrenewable resource producers in New Brunswick in 1988.

PRODUCTION

	Production (t)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
MILLED ORE (No. 12 mine)	3 493 940	0.36	3.58	8.85	105
CONCENTRATE					
Copper	33 661	21.83	6.20	3.05	2 700
Lead	185 734	0.62	34.03	4.7	501
Zinc	443 593	0.28	1.98	50.44	91
Bulk	72 844	0.70	18.25	33.14	353
TAILINGS	2 757 151	0.09	1.36	1.87	42

DEVELOPMENTS Brunswick Mining & Smelting Corporation Limited experienced an outstanding year as the price of zinc, copper, and cadmium rose to remarkable levels, compared to recent historical values. This resulted in Brunswick achieving net earnings in excess of \$31 000 000 compared to \$19 000 000 in 1988 and it is expected that because of current projected price stability Brunswick will experience one of its most profitable years in recent memory during 1989.

Employment at the operation remained relatively stable and a minimum of labour unrest was experienced, as the Company is in the middle of a three-year collective agreement with the United Steelworker's Union. No extensive unscheduled shutdowns were experienced in 1988 and production was comparable to 1987. The deepening of No. 3 Shaft was completed in 1988, and a one-month shutdown will be required in July 1989 to rerope the shaft. During that period ore will be hoisted on a limited basis from No. 2 Shaft.

Zinc and bulk concentrate are shipped to foreign ports from Brunswick's port facilities in Belledune, while lead concentrate is smelted at the Company's lead refinery also located in Belledune, 30 km northwest of Bathurst. Federal preliminary estimates indicate 73 289 000 kg of lead, 202 000 kg of silver were smelted during 1988, as well as significant quantities of antimony, bismuth, copper, and gold. Sulphur from smelter gas is also used to make sulphuric acid, which is a key component for making diammonium phosphate fertilizer at the company's adjoining Belledune fertilizer plant.

Reclamation of the No. 6 and No. 12 mine sites is progressing, with approximately 25 ha reclaimed in 1988. Sulphide waste material is also being placed in the flooded No. 6 pit to reduce oxidation. Other environmental problems remain a concern at the mine site, with the reduction of thiosalt generation remaining a priority.

Dominion Explorers Inc.

21 G/14E

LOCATION The Lake George antimony mine is situated about 15 km north of Harvey Station, York County (Figure 22).

RIGHTS In 1988, Dominion Explorers Inc. held Mining Licence 1235 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY Dominion Explorers Inc. (Durham Mines Division) owns and operates North America's largest and Canada's only primary producing antimony mine. Dominion Explorers Inc. is a subsidiary of Landmark Corp. The head office is located at 111 Richmond Street West, Toronto, Ontario, M5H 2G4. Chairman, president and C.E.O. is R.B. Coleman; the Mine Manager is C. Morrissy.

HISTORY Antimony sulphide was first discovered on the property in 1863. There was minor production between 1880 and 1884. The first major development that led to production occurred between 1969 and 1971. The mine produced until 1981 when it ran out of known reserves. Exploration diamond drilling in 1980-1981 outlined a new antimony ore zone (No. 2 mine) with reserves of 900 000 t of 4% Sb. Development and mining began in 1985. At the June 25th, 1987 Annual Meeting of Landmark Corporation (formerly Durham Resources Inc.) the company's Lake George antimony mine (Durham Mines) was sold to a Landmark-controlled subsidiary, Dominion Explorers Inc. The former Durham Resources Inc. now operates under Dominion Explorers Inc. (Durham Mines Division).

EMPLOYEES There were 86 persons employed on the site in 1988.

RESERVES 304 000 t of ore with 3.32% Sb (December, 1988).

PRODUCTION Production in 1988 was 119 082 t of ore yielding 4254 t of antimony concentrate.

DEVELOPMENTS Production was down marginally from 1987's record-breaking performance, as were antimony prices. Prices experienced a bit of a rebound near the end of the year and the Company is optimistic for 1989. The workforce also fell slightly from the previous year's level, mostly due to the completion of the shaft-deepening project.

Since the completion of that undertaking, mining operations have focused on the opening up of the new 1275-foot level where a stibnite vein averaging 5.68% Sb has been encountered over a significant strike length. During 1989 it is planned to develop the 1350-foot level while no further work is scheduled for the gold-bearing zone located parallel to the main antimony orebody. Surface drilling in excess of 42 600 m was performed over the year, with the results looking reasonably promising. No further work is expected to take place on the gold-bearing zone discovered during the previous year.

No other major changes are planned for the mine in the near future, with current management placing it's emphasis on improved efficiency for the operation.

Gordex Minerals Limited

21 H/4W

LOCATION The Gordex Minerals Limited gold property is located at Cape Spencer, 15 km southeast of the City of Saint John, along the Bay of Fundy coast (Figure 22).

RIGHTS In 1988, Gordex Minerals Limited in partnership with Cambior Inc. (55%) held Mining Licence 1371 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

COMPANY Gordex Minerals Limited, P.O. Box 7071, Station A, Saint John, N.B. E2L 4S5. The President of Gordex Minerals Limited is Mr. H.E. Pawson.

HISTORY Minor amounts of gold were found near the lighthouse several years ago. The property was staked in 1979-1980 by Mr. Morton Gordon. An intensive exploration programme conducted during the summer of 1982 led to the delineation of an extensive alteration zone with numerous gold-bearing quartz veins. Gordex Minerals Limited mined 30 000 t of ore from its surface workings on the Cape Spencer gold deposit in 1985 and has received permission from the appropriate provincial departments to operate a 30 000 t demonstration plant to leach gold from the ores. In addition, another 15 000 t was placed on the heap pad in 1986. The leaching of the gold with $\text{Ca}(\text{CN})_2$ was carried out in the summer of 1986 and the recovery of gold from the demonstration heap leach was successful. At the end of the year, Gordex was carrying out a substantial exploration programme to confirm ore reserves in the Cape Spencer area. During 1987 several modifications were made to the gold extraction procedure at Cape Spencer. The heap leaching operation was converted to an earthen vat leaching process. This provides a better means of controlling extraneous water from diluting the leach cycle. At the same time the gold extraction mechanism was converted from a zinc precipitate to a carbon-in-pulp treatment. Both these changes have resulted in better recoveries of gold.

RESERVES (Published) 671 328 t of ore, grading 3.3 g/t Au, has been outlined on the property to a depth of 152 m. The property has potential reserves of 3 000 000 t.

DEVELOPMENTS During the year Gordex signed a formal option agreement with Cambior Inc., which will see a major exploration programme initiated on adjacent claims to the existing operation. Cambior can earn a 55% interest in the property by spending \$1 500 000 and financing development and production. Interest in the operation was sparked by a drilling programme initiated by Gordex which indicated a gold mineralization zone approximately 130 m wide with a strike length of 160 m, open at a depth of 95 m to 210 m. Intersections from the 11 holes drilled graded 6.17 g/t Ag (cut grade) over an average width of 5.6 m.

Production at the site was up significantly over last year and it is expected to improve even more in 1989, as operating techniques become more refined. The mining operation ran from June to November and leaching will continue year round. The vat-leaching process that was implemented last year has proven quite successful and is now the accepted method of processing the mined ore. The carbon-in-pulp procedure used to extract the gold from the cyanide solution has also proved quite effective and high recoveries are being maintained.

Reserves are down marginally from last year on the existing mine site; however, it is expected that the extensive exploration drilling program proposed by Cambior Inc. will indicate some promising results during the coming year.

EMPLOYEES At the end of 1988 the operation had a staff of 16 with 20 contracted employees on site.

NONMETALLIC MINERALS

PEAT¹³

Seventeen companies were engaged in the production of peat moss in 1988. Fafard Peat Moss Co. Ltd. purchased Burnt Church Peat Moss Co. Ltd. and Lamèque Peat Moss Co. Ltd. bought Atkins & Durbrow (N.B.) Ltd. Record shipment levels were reached despite average weather conditions.

The total surface area of peatlands under lease in 1988 was 10 573 ha, of which about 3800 ha were developed for production. Raw peat moss accounts for 92% of the shipments with the remaining 8% consisting of peat-based soil amendments. The industry's major export markets are the United States and Japan.

Peat Shipments

Year	Bale Equivalents*
1984	3 858 059
1985	4 100 927
1986	6 059 991
1987	6 290 049
1988	6 525 006

* Bale equivalent = 0.170 m³ of peat compressed at a ratio of 2:1, and having a 50% moisture content.

Acadian Peat Moss (1979) Ltd.

COMPANY Acadian Peat Moss (1979) Ltd., P.O. Box 240, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2225. The President is Elphege Chiasson; the Manager is Jean-Marc Savoie.

RIGHTS Peat Moss Lease No. 13 (232 ha) on Bog 568 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 568 is adjacent to the Coteau Road on Lamèque Island, Gloucester County (Figure 22).

HISTORY Established in 1965, the company originally produced block-cut peat, but now also produces milled peat. Following a disastrous fire in 1981 the company resumed full production in 1982. Labour-management conflict disrupted operations in 1988.

PRESENT OWNERSHIP Acadian Peat Moss (1979) Ltd.

PRODUCTION The company produces baled peat.

EMPLOYEES 1988 - 8 to 62 persons.

DEVELOPMENT Continued expansion of existing lease.

ASB Greenworld Ltd.

COMPANY ASB Greenworld Ltd., Pointe-Sapin, Kent County, New Brunswick E0A 2A0. Telephone: (506) 876-3937. The Manager is Andreas Avenriep.

RIGHTS Peat Moss Lease No. 19 (627 ha) on Bog 324E, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324E is located 1 km northwest of Pointe-Sapin in Kent County (Figure 22).

HISTORY The company commenced site preparation in 1978 prior to acquiring a lease in 1982.

PRESENT OWNERSHIP ASB Greenworld Ltd.

PRODUCTION The company produces baled peat and peat-soil mixes.

DEVELOPMENT The company continued to work toward increasing the ratio of soil mixes to baled peat.

EMPLOYEES 1988 - 9 to 48 persons.

Berger Mix Inc.

COMPANY Berger Mix Inc., 121, R.R. #1, St-Modeste, Cté Rivière-du-Loup, Québec GOL 3W0. The President is Claudin Berger. Telephone: (418) 862-4462.

RIGHTS Peat Exploration Licence 85-1 (681 ha) on Bog 337, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 337 is adjacent to Hwy 117, 2 km north of St-Camille, Kent County (Figure 22).

HISTORY In 1985, Berger Mix Inc. acquired a Peat Exploration Licence that was converted to a Peat Lease in 1986. Production began in 1987.

PRODUCTION The company produces milled peat.

DEVELOPMENT The company continued to expand its production fields.

EMPLOYEES 1988 - 0 to 17 persons.

Canadian Supreme Products Ltd.

COMPANY Canadian Supreme Products Ltd., P.O. Box 570, Lamèque, N.B. EOB 1V0. Telephone: (506) 344-2293. The manager is Laurie Chiasson.

RIGHTS Peat Moss Lease No. 16 (413 ha) on Bogs 516 and 517, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs 516 and 517 are located 1.5 km east of Portage River, Northumberland County (Figure 22).

HISTORY Portage Peat Moss Ltd. started commercial production in 1972. In 1985, Canadian Supreme Products Ltd., an affiliate company of Lamèque Peat Moss Ltd., acquired the operation.

PRESENT OWNERSHIP Canadian Supreme Products Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT The bog continued to be developed at a rate consistent with market demand.

EMPLOYEES 1988 - 2 to 28 persons.

Chiasson Peat Moss Ltd.

COMPANY Chiasson Peat Moss Ltd., P.O. Box 112, Lamèque, New Brunswick EOB 1V0. Telephone: (506) 344-2426. The President is Elphege Chiasson; the Manager is Gilles Haché.

RIGHTS Peat Moss Lease No. 23 (76 ha) on Bog 567 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 567 is located 3 km southeast of Petit-Shippagan (Figure 22).

HISTORY The company acquired an Exploration Licence in 1982 and converted to a lease in the same year. Before 1987, all the production was processed at the facilities of Acadian Peat Moss (1979) Ltd. A bagging plant was installed on site in 1987.

PRESENT OWNERSHIP Chiasson Peat Moss Ltd.

PRODUCTION The company produces baled peat.

DEVELOPMENT Baled peat production was continued.

EMPLOYEES 1988 - 0 to 20 persons.

Fafard Peat Moss Co. Ltd.

COMPANY Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, Gloucester County, New Brunswick. Telephone: (506) 336-2325. The Manager is René Martin.

RIGHTS Peat Moss Lease Nos. 4 (364 ha), 5 (506 ha), and 6 (607 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs are in Gloucester County (Figure 22).

Lease	Bog No.	Size (ha)	Location
4	530	364	Pokemouche Bog, off Route 113 at Inkerman
5	532	506	Six-Roads Bog, 15 km south of Shippagan
6	529	607	Inkerman Ferry Bog, 8 km southwest of Shippagan

HISTORY The company began operations in New Brunswick in 1942 by opening a bog near Shippagan (Bog 530). New plants were opened in 1955 at Six-Roads (Bog 532) and in 1960 at Inkerman Ferry (Bog 529). Initial production was block-cut peat but by 1973 the entire operation had changed to milled peat. Since 1985, the production of baled peat mixes has become an important aspect of the New Brunswick operation.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd.

PRODUCTION The company produces baled peat and peat mixes.

DEVELOPMENT Continued to develop the remaining potential on Bogs 529 and 532. Sections of Bog 530 that were originally hand cut have been abandoned. Plans are underway to build a perlite-vermiculite processing plant and a new peat-mix plant.

EMPLOYEES 1988 - 14 to 129 persons.

Fisons Western Corporation

COMPANY Fisons Western Corp., Maisonnnette, New Brunswick EOB 1X0. Telephone: (506) 727-3428. The Manager is Edward Puhacz.

RIGHTS Peat Moss Lease No. 10 (1406 ha), No. 12 (396 ha) and No. 26 (318 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION (Figure 22)

Lease	Bog No.	Location
10	591	2 km south of Lamèque
	592	4 km southeast of Lamèque
12	562	6 km west of Lamèque at Maisonnnette
26	527	1 km south of the centre of Shippagan

HISTORY In 1929, Western Peat Company Limited (the forerunner of Western Peat Moss Ltd.) commenced operations on a small sphagnum bog in Whalley, British Columbia. In 1963, the original shareholders sold their interests in Western to an American company, Red Wing Peat Corporation. Western became the Canadian producing company, and Red Wing assumed the responsibility for marketing the company's products in the United States. In 1964, following up work that had begun earlier, a base of operations was established at Maisonnnette (Bog 562). In 1970, Red Wing established a second base of operations in New Brunswick when it purchased Atlantic Peat Moss Co. Ltd. at Shippagan. Atlantic had produced from Bog 527 (1953-1971) and from Bog 591 since 1952. In 1974, S.B. McLaughlin Associates Limited of Toronto, Ontario, purchased the holdings of the major shareholder, Red Wing, and assumed control. This was followed by the combination of the business operations of Western and Atlantic into Western Peat Moss Limited. In 1980, Fisons, a British company, acquired a 50% interest in Western Peat Moss Limited. The joint venture company was renamed Fisons Western Peat Moss Limited and then changed to Fisons Western Corporation in January 1982, when Fisons acquired the remaining McLaughlin interests. Bog 527 was abandoned in 1971 due to fire hazard to the town of Shippagan and converted to Peat Lease 26 in 1984. The new plant on Lamèque Island (Bog 591) opened in 1981.

PRESENT OWNERSHIP Fisons Western Corporation.

PRODUCTION The company produces baled peat and peat mixes.

DEVELOPMENT Development continued on Bog 591, eventually leading to development of Bog 592. The company added a peat-mix plant at its Lamèque facilities (Lease 10).

EMPLOYEES 1988 - 15 to 183 persons.

Good Earth Canada Ltd.

COMPANY Good Earth Canada Ltd., 5960 Broadway, Lancaster, N.Y., 14086, U.S.A. Telephone: (716) 684-8111. The President is Guenter Burkhardt.

RIGHTS Peat Moss Lease No. 30 (734 ha) on Bog 338, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 338 is located at Point Escuminac, 50 km east of Chatham, Kent County. (Figure 22).

HISTORY The company was issued a Peat Lease in 1986 following the cancellation of Peat Lease No. 21 (Gulf Peat Co. Ltd.) on January 31, 1986. Production began in 1987.

PRODUCTION The company produces milled peat.

DEVELOPMENT Site preparation included land clearing and excavation of drainage ditches.

EMPLOYEES 1988 - 2 to 22 persons.

Grande-Anse Peat Moss Co. Ltd.

COMPANY Grande-Anse Peat Moss Co. Ltd., P.O. Box 90, Grande-Anse, Gloucester County, New Brunswick E0B 1R0. Telephone: (506) 732-2854. The President is Paul Tocci; the Manager is Patricia Whelton.

RIGHTS Peat Moss Lease No. 8 (166 ha) on Bog 561, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 561 is located 3 km southeast of Grande-Anse (Figure 22).

HISTORY The company started block-cut peat operations in 1961 by hand cutting, but converted to mechanization in 1966. The conversion to milled peat began in 1977.

PRESENT OWNERSHIP Grande-Anse Peat Moss Co. Ltd.

PRODUCTION Company produces baled peat.

DEVELOPMENT Continued production.

EMPLOYEES 1988 - 1 to 40 persons.

Heveco Ltd.

COMPANY Heveco Ltd., P.O. Box 30, Tabusintac, Northumberland County, New Brunswick E0C 2A0. Telephone: (506) 779-9277. The Manager is Myles Wishart.

RIGHTS Peat Moss Lease No. 9 (1080 ha) and No. 24 (174 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 522 (Lease 24) is 2 km east of Brantville and Bog 524 (Lease 9) is 2 km southeast of Tabusintac (Figure 22).

HISTORY The company, incorporated in 1962, produces block-cut peat and peat mixes. Milled peat production commenced in 1981.

PRESENT OWNERSHIP Heveco Ltd.

PRODUCTION The company produces block-cut peat and peat mixes. Bog 524 has numerous lakes throughout, which have caused drainage problems and thus reduced the area in production.

DEVELOPMENT Continued production from Bog 524 and development of Bog 522.

EMPLOYEES 1988 - 31 to 86 persons.

Kent Peat Moss Ltd.

COMPANY Kent Peat Moss Ltd., R.R. #2, Saint-Paul, Kent County, New Brunswick E0A 2B0. Telephone: (506) 955-3098. The Manager is Eloi Maillet.

RIGHTS Peat Moss Lease No. 25 (393 ha) on Bog 41, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 41 is located 0.6 km west of Birch Ridge, Kent County (Figure 22).

HISTORY The company acquired a Peat Exploration Licence in 1982 and converted to a Peat Moss Lease in 1983. In 1987, Fafard Peat Moss Co. Ltd. acquired the operation.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, New Brunswick, E0B 2P0. Telephone: (506) 336-2325.

PRODUCTION The company produces milled peat.

DEVELOPMENT The layout of production fields has been upgraded.

EMPLOYEES 1988 - 1 to 20 persons.

Lamèque Peat Moss Ltd.

COMPANY Lamèque Peat Moss Ltd., P.O. Box 570, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2293. The Manager is Florent Chiasson.

RIGHTS Peat Moss Lease No. 14 (142 ha) on Bog 580 and Peat Moss Lease No. 28 (104 ha) on Bog 578, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 580 is 4 km north of Lamèque and Bog 578 is 2 km north of Petite-Lamèque, both in Gloucester County (Figure 22).

HISTORY The company, established in 1971, is producing milled peat.

PRESENT OWNERSHIP Lamèque Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Lamèque Peat Moss Ltd. continued to develop the Crown portion of the bog to its full potential.

EMPLOYEES 1988 - 9 to 33 persons.

Malpec Peat Moss Ltd.

COMPANY Malpec Peat Moss Ltd., P.O. Box 118, Rexton, New Brunswick E0A 1L0. Telephone: (506) 523-9161. The President is Solomon Curry.

RIGHTS Peat Moss Lease No. 20 (249 ha) on Bog 213 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 213 is located 3 km west of Rexton, Kent County (Figure 22).

HISTORY The company was issued a Peat Moss Lease in 1982. It commenced milled peat production in 1985.

PRESENT OWNERSHIP Malpec Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT The company continued to expand production fields.

EMPLOYEES 1988 - 5 to 64 persons.

Pigeon Hill Peat Moss Ltd.

COMPANY Pigeon Hill Peat Moss Ltd., P.O. Box 639, Lamèque, New Brunswick EOB 1V0. Telephone: (506) 344-5653. The President is Edmond Chiasson.

RIGHTS Peat Moss Lease No. 18 (234 ha) on Bog 569 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 569 is located at Pigeon Hill on Lamèque Island, Gloucester County (Figure 22).

HISTORY Company acquired a Peat Moss Lease in 1979.

PRESENT OWNERSHIP Pigeon Hill Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Pigeon Hill Peat Moss Ltd. continued to expand production fields.

EMPLOYEES 1988 - 3 to 16 persons.

Pokesudie Peat Moss Co. Ltd.

COMPANY Pokesudie Peat Moss Ltd., P.O. Box 570, Lamèque, Gloucester County, New Brunswick, EOB 1V0. Telephone (506) 727-3385. The Manager is R. Godin.

RIGHTS Peat Moss Lease No. 7 (202 ha) on Bog 600, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 600 is located on Pokesudie Island (Figure 22).

HISTORY In 1960, a lease was granted to Bushland Products Limited. The lease was transferred to Atkins & Durbrow (N.B.) Ltd. in 1967. Following a disastrous fire in 1978, the plant was rebuilt and production resumed in late 1980. Pokesudie Peat Moss Ltd., an affiliate of Lamèque Peat Moss Ltd., acquired the property in 1988.

PRESENT OWNERSHIP Pokesudie Peat Moss Ltd.

PRODUCTION The company produces baled peat.

DEVELOPMENT Continued peat production.

EMPLOYEES 1988 - 1 to 30 persons

St-Raphaël Peat Moss Ltd.

COMPANY St-Raphaël Peat Moss Ltd., P.O. Box 570, Haut-Lamèque, New Brunswick EOB 1V0. Telephone: (506) 344-7058. The Secretary-Treasurer is Florent Chiasson.

RIGHTS Peat Moss Lease No. 17 (115 ha) on Bog 576, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 576 is 4 km east of Haut-Lamèque, Lamèque Island (Figure 22).

HISTORY Peat Moss Lease No. 17 was acquired in 1977.

PRESENT OWNERSHIP St-Raphaël Peat Moss Ltd. is an affiliate company of Lamèque Peat Moss Ltd.

PRODUCTION Company produces milled peat and peat-based composts.

DEVELOPMENT Continued peat production with bog operating at capacity. Testing the feasibility of producing a peat/fish waste compost.

EMPLOYEES 1988 - 2 to 31 persons.

Theriault and Hachey Peat Moss Ltd.

COMPANY Theriault and Hachey Peat Moss Ltd., R.R.#1, Baie-Sainte-Anne, Northumberland County, New Brunswick EOC 1A0. Telephone: (506) 228-4530. The President is Isaac Theriault; the Vice-President is Gary Williston.

RIGHTS Peat Moss Lease No. 11 (330 ha) on Bog 324W and Peat Moss Lease No. 27 (125 ha) on Bog 302A under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324W is located 6 km south of Eel River Bridge and Bog 302A is located 7 km south of Eel River Bridge, both in Northumberland County (Figure 22).

HISTORY The company was formed in 1963, but block-cut peat had been produced from the site since 1961. In 1977 the block-cutting operation was converted to a milled peat operation. The company acquired the Peat Moss Lease on Bog 302A in 1985.

PRESENT OWNERSHIP Theriault and Hachey Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Theriault and Hachey Peat Moss Ltd. is continuing to open new fields on Bog 324W. Site preparation on Bog 302A has begun.

EMPLOYEES 1988 - 3 to 48 persons.

POTASH/SALT¹⁴

Denison-Potacan Potash Company

21 H/12E

COMPANY Denison-Potacan Potash Company, P.O. Box 5005, Sussex, New Brunswick E0E 1P0. Telephone: (506) 839-2146. The General Manager is I.N. Duke.

RIGHTS 8.887 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION Denison-Potacan Potash Company is located about 20 km southwest of Sussex, Kings County (Figure 22).

HISTORY The Salt Springs potash-salt deposit was discovered by the Department of Natural Resources in 1973. Subsequent exploration and development rights to a 120 km² reservation area were granted to International Minerals and Chemical Corporation (IMC). Full-scale exploration (22 drill holes) began in 1975, and was successful in confirming a significant orebody.

Despite extremely encouraging results of the drilling programme, IMC decided to sell the property to Denison Mines Limited of Toronto late in 1978. Construction of a 5 m diameter exploration mine shaft was commenced in September 1979 and reached a target depth of 835 m by 1982.

In December 1980, Denison Mines Limited assigned a 40% interest to Potash Company of Canada Limited (Potacan). Potacan is owned jointly by Entreprise Minière et Chimique, and Kali und Salz Ag. Denison Mines Limited remains the overall development manager, with potash sales being handled by Potacan.

A feasibility study completed in 1982 resulted in a production decision announcement on February 7, 1983.

Work on the No. 2 shaft, the production shaft, commenced in 1983, along with continued underground development and the construction of the surface infrastructure related to the mill facility, tailings storage, and brine disposal. By July, 1985 all preproduction work was completed and the first shipment of potash destined for Colombia was made on September 17, 1985.

PRESENT OWNERSHIP 60% Denison Mines Ltd., 40% Potash Company of Canada (Potacan).

RESERVES AND GRADE Underground exploration in 1982 has blocked out more than 41 000 000 t of 28.5% K₂O, sufficient for the initial 5 years of production. Together with the 22 surface drill holes, the underground work to date has established total reserves of 230 000 000 t (proven and possible).

PRODUCTION Production commenced in July 1985 and has been gradually building up to the operation's annual rated capacity of 1 300 000 product tonnes. In 1986, Denison Potacan operated near 80% of its capacity.

DEVELOPMENT Emphasis was placed in bringing the mill up to its full design capacity of 780 000 t K₂O. Backfill placement in the mine began in 1987. The mill regularly achieved production levels of 85% of capacity. On-going improvements at the mill continue to increase recoveries to the design level. A new crystallizer circuit became operational in 1988, improving mill recovery to the 90% level.

EMPLOYEES Average of 450 persons in 1988.

Potash Company of America
(a Division of Rio Algom Limited)

21 H/11W, 14W

COMPANY Potash Company of America (a division of Rio Algom Limited), P.O. Box 1489, Sussex, New Brunswick E0E 1P0. Telephone: (506) 433-5445. The General Manager of Operations is Donald Roberts.

RIGHTS 19 187 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION The Potash Company of America mine/mill facility is located about 5 km east of Sussex, Kings County, on the north side of Highway 2 (Figure 22).

HISTORY Following the discovery of potash in the Plumweseep-Penobscis area by the New Brunswick Department of Natural Resources in 1971, exploration and development rights covering a 360 km² reservation area were granted to the Potash Company of America in 1973. After a comprehensive exploration programme and feasibility study, the company decided to proceed with the construction of a 5 m diameter exploratory mine shaft in the spring of 1978. The exploration shaft was completed in April and underground exploration in October of 1980. On October 27, 1980, the Potash Company of America announced that it was proceeding to production with a mine capacity of 900 000 t/a although initial capacity would be 630 000 t/a.

Mine development, mill construction, and the Courtenay Bay potash shipping terminal in Saint John were completed in 1983. The first potash was produced from the mill on July 17, 1983. The first shipment of potash through the port facility in Saint John took place early in 1984.

PRESENT OWNERSHIP Rio Algom Limited, 120 Adelaide St. W, Toronto, Ontario M5H 1W5.

RESERVES AND GRADE Sufficient tonnage has been indicated by drilling to support a 1 000 000 t/a plant for 20 years or more.

PRODUCTION Potash and salt production, which commenced in 1983, continued throughout 1988. Salt production levels were maintained in excess of 400 000 t/a.

DEVELOPMENT After purchasing PCA early in 1986, Rio Algom

Limited has committed over \$30 000 000 to improvements designed to bring the Sussex mine up to its rated capacity of 635 000 product tonnes per year by April 1987. A considerable amount was spent in the mine to improve the reliability and capacity of the conveyor systems. In the mill, PCA has been working toward improving equipment uptime and boosting potash recovery rates. Recovery rates have improved significantly since start-up. In 1988, PCA operated near 85% of capacity.

Work continued on improvements to the tailings handling system. A rock mechanics programme has also been initiated in the mine.

EMPLOYEES Average of 340 persons for 1988.

LIMESTONE/DOLOMITE¹⁴

Brookville Manufacturing Company Ltd.

21 H/5

COMPANY Brookville Manufacturing Company Ltd., P.O. Box 2332, Saint John, New Brunswick E2L 3V6. The General Manager is M. Sanford.

RIGHTS Original King's Land Grant.

LOCATION Brookville, East Saint John, Saint John County. The quarry and crushing operation is located between Highway 1 (Sussex-Saint John Highway) and Highway 100 (Rothesay Highway), approximately 2 km east of their junction. Access to the quarry is via the Rothesay Highway (Figure 22).

HISTORY The company commenced operations more than 60 years ago, primarily producing agricultural limestone and aggregate. It has been operating almost continuously since.

PRESENT OWNERSHIP R.H. Oland (Moosehead Breweries Ltd.).

RESERVES AND GRADE At present market levels, adequate reserves of stone are estimated for several more years. Although grade varies between areas of high-calcium limestone and dolomite throughout the quarry, the bulk of production is centred in the more dolomitic areas where grades fluctuate from 40 to 45% $MgCO_3$.

PRODUCTION The company produces about 140 000 t of aggregate products each year. These include agricultural dolomitic limestone, cement, asphaltic aggregate, and road metal.

DEVELOPMENT Continued operation.

EMPLOYEES 28 persons (average number).

LIMESTONE/GYPSUM¹⁴

Lafarge Canada Inc.

21 I/3W

COMPANY Lafarge Canada Inc. The plant address is R.R. #1, Havelock, New Brunswick E0A 1W0. Telephone: (506) 534-2301. The Manager is H. Kierstead.

RIGHTS 632.5 ha Mining Lease No. 245 (includes existing plant and operating quarries). The Mining Lease is under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION Limestone quarries and cement plant are located adjacent to Highway 880, about 5 km east of Havelock, Westmorland County (Figure 22).

The company also maintains mineral rights to a gypsum quarry located less than 5 km north of Petitcodiac, Westmorland County.

HISTORY Limestone quarries near the plant have been supplying raw material for manufacture of cement since 1952. In 1987, the company closed its cement production facility; however, it continues to quarry stone used for other purposes.

A new limestone quarry (the McGee quarry) was opened in 1986 just north of Highway 880, less than 1 km east of the plant. This quarry was opened in an area known to contain extensive reserves of high-calcium limestone. The property was partially investigated in 1976. A drilling programme was undertaken in 1985 to further verify the quality and extent of the deposit prior to the establishment of the new quarry site.

Initial quarrying of gypsum at Intervale began in 1880. The Albert Manufacturing Co. produced 1179 t/a, between 1932 and 1935. In 1950, the property was acquired by Canada Cement Company Ltd. (now Lafarge Canada Inc.) who had worked the quarry periodically until 1987.

PRESENT OWNERSHIP Lafarge Canada Inc.

RESERVES AND GRADE Reserves of high-grade limestone (i.e., 50-53% CaO) on properties held under Mining Lease by Lafarge Canada Inc. have been estimated between 75 000 000 t and 100 000 000 t.

Reserves of the McGee quarry are estimated in excess of 10 000 000 t of limestone grading 50% CaO or better.

At Intervale, reserves of 97% gypsum have been estimated at just less than 4 000 000 t.

PRODUCTION Historically, the company has produced up to 400 000 t of limestone annually, primarily for use in cement manufacturing. However, since the closure of its plant, stone quarried for cement production has ceased. Despite the plant shut-down, Lafarge continued to quarry stone at its McGee quarry through 1988. The company has a 10-year agreement with

Havelock Lime (a Division of Dickenson Mines Ltd.) to supply up to 400 000 t of raw stone on a yearly basis.

Canada Cement Lafarge Ltd. also produces aggregate for its subsidiary, Permanent Concrete Ltd.

Gypsum has been produced from Intervale as required (5 000 to 25 000 t/a). However, due to the scale-down and closure of the Havelock cement operation, no significant production has been recorded in recent years.

DEVELOPMENT Continued operation. Stone is supplied to Havelock Lime.

EMPLOYEES 3 persons in 1988.

LIMESTONE¹⁴

Elmtree Resources Ltd.

(21 P/13W)

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas; the Manager and Vice-President is G.M. Doucet.

RIGHTS 245.9 ha Mining Lease No. 249, under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION The Elmtree quarry is located about 20 km north of Bathurst near the Village of Petit Rocher, Gloucester County (Figure 22).

HISTORY A quarry has existed on this site since 1880 and was operated on a 1814 t/a basis from 1930 to 1960 by Elmtree Co-op. Since 1960, it was operated on an intermittent basis until 1978 when it was acquired by Elmtree Resources Limited. Following extensive trenching and mapping, the quarry was expanded to include a crushing and screening plant, and a large storage facility.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Reserves appear to be adequate in the explored area for a few more years of operation at current production levels. The cutoff grade is 50% CaO.

PRODUCTION Approximately 60 000 to 90 000 t of limestone is quarried and crushed annually. It is primarily sold to the smelter at Belledune for flux. Some material is marketed as agricultural lime, construction stone, and fertilizer filler.

DEVELOPMENT Continued operation.

EMPLOYEES 10 persons (average number).

Havelock Lime (a Division of Dickenson Mines Limited) 21 H/13W

COMPANY Havelock Lime, P.O. Box 59, Havelock, New Brunswick E0E 1W0. Telephone: (506) 534-2311. The General Manager is L. Murray.

RIGHTS 182.4 ha Mining Lease No. 244 (includes plant); 282.9 ha Mining Lease No. 243 (operating quarry). All rights are under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION The company operates a quarry at Samphill, about 5 km west of Havelock. A processing facility is situated less than 1 km east of the Village (Figure 22).

HISTORY Havelock Lime, formerly Havelock Lime Works Ltd., has been quarrying in the area since 1939. The original company was incorporated in 1964, and in 1970 a subsidiary company, Havelock Processing Ltd., was formed to manage the manufacturing of quick and hydrated lime. In 1984, Dickenson Mines Ltd. purchased the Havelock group of companies.

PRESENT OWNERSHIP Dickenson Mines Limited.

RESERVES AND GRADE Less than 5 000 000 t of 95% CaCO_3 are estimated to remain at Havelock's Samphill quarry following current extraction practices. However, this tonnage can be increased if a greater overburden-to-stone stripping ratio can be economically achieved.

PRODUCTION The company has traditionally processed about 300 000 to 400 000 t of stone annually. Chemical process stone (for use as flux in nonferrous smelters, glass industry, pulp and paper mills and fibreglass), pulverized stone (for use in dusting mines and agricultural purposes), poultry grit, and crushed stone (for use as concrete aggregate and for general construction) are among the products currently produced.

DEVELOPMENT Expansion plans have been completed recently, with the construction of a new kiln. The 300 t/a annular-shaft kiln installation is expected to be completed in 1988. The new kiln should realize significant fuel savings and provide long-term market competitiveness. A significant amount of stone is purchased from Lafarge Canada Inc. who operates a nearby quarry.

EMPLOYEES 34 persons (average number).

Upper Kent Lime Works Ltd. 21 J/12

COMPANY Upper Kent Lime Works Ltd. R.R. 3, Bath, New Brunswick E0E 1E0. Telephone: (506) 278-5359. Contact person is Douglas Lloyd.

RIGHTS Mining Lease No. 242 (16.2 ha) under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION This deposit consists of marl occurring in the bottom of a partially drained lake at Maplehurst, 15 km north of the Village of Bath (Figure 22).

HISTORY The deposit has been worked since the late 1950s and was acquired by the present owners in 1973.

PRESENT OWNERSHIP Upper Kent Lime Works Ltd.

RESERVES AND GRADE It is estimated that 25 000 to 30 000 t of marl ranging between 85% and 95% CaCO_3 remains at this location.

PRODUCTION The water level has been lowered slightly and the marl is within 1 m of the surface. Marl is extracted by a drag line from the lake bottom, spread on the adjacent hillside to dry, and stockpiled. It is then screened to remove pebbles, twigs, etc., and trucked to local farmers for use in potato fields. The main operating period is late April to June. An additional two- to three-week period of operation typically occurs in the fall to stockpile material. Annual sales are in the order of 2000 to 2500 t.

DEVELOPMENT Continued operation.

EMPLOYEES 3-4 persons

SILICA¹⁴

Chaleur Silica Limited

21 P/12E

COMPANY Chaleur Silica Limited, c/o Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Manager is Al Buzas.

RIGHTS Original King's Land Grant.

LOCATION The Bass River silica quarry is located south of Highway 11, approximately 6.5 km east of Bathurst, Gloucester County (Figure 22).

HISTORY The property was originally explored by East Coast Smelting and Chemical Company in 1961, but the property remained undeveloped until 1974 when World Wide Explorations opened a small quarry. It was purchased by Godin M-E in 1976. The operation was expanded and modernized, and is now operated under the name Chaleur Silica Limited. A sandblast sand plant, with 77-91 t/d capacity of bagged sand, was installed in 1979.

In 1983, five holes were drilled on a second property adjacent to the Nepisiquit River. Ten metres of siliceous stone similar to that already being quarried was intersected.

PRESENT OWNERSHIP The deposit is owned by A. Ronalds and G. Ronalds under an original King's Grant and mined under an agreement with Chaleur Silica Limited.

RESERVES AND GRADE Reserves are estimated to be in excess of 500 000 t of 95% SiO_2 ; however, most is inaccessible due to ownership problems.

PRODUCTION The quarry operates on a seasonal basis and has produced up to 60 000 t of silica annually. Markets are almost entirely dependent on the sale of silica flux to the smelter at Belledune; however, some blasting sand and nursery sand have been produced.

DEVELOPMENT In 1988, the operation was sold to Elmtree Resources Ltd. who intends to maintain production, pending market demand.

EMPLOYEES N/A

Sussex Silica Inc.

21 H/12E

COMPANY Baskatong Quartz Ltd., P.O. Box 337, N.D.G., Montreal, Québec, H4A 3P6. Telephone: 514-482-6357; and Lockhart Exploration Services Ltd., P.O. Box 515, 328 King St., Fredericton, N.B., E3B 5A6. Telephone: 454-3508. Mine Site: R.R.#3, Sussex, N.B. E0E 1P0. Telephone: 433-5890. Mine Manager is Robin Turner.

RIGHTS Mining Lease 241 (599.8 ha) and 24 claims (387 ha) under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION This deposit of unconsolidated silica sand is about 16 km southwest of Sussex, immediately northeast of Cassidy Lake (Figure 22).

HISTORY The deposit was discovered in 1982. After identifying sufficient reserves of high-quality sand, a pilot plant was set up in 1983 for product testing and marketing. Full-scale production began in 1986.

PRESENT OWNERSHIP SKW Canada Inc., in trust. Baskatong Quartz Ltd. of Québec and Lockhart Exploration Services Ltd. have interests in the property.

RESERVES AND GRADE Approximately 9 000 000 t proven reserves and more than 22 000 000 t possible reserves of silica sand containing greater than 98% SiO₂ are indicated.

PRODUCTION Production from this mine began in the fall of 1986, consisting of several thousand tonnes of lump silica and sand of various sizes. The lump silica was used in the manufacture of silicon metal and silicon carbide at Becancour, Québec. Existing capacity of the operation is estimated at 80 000 t/a.

DEVELOPMENT Plans to gradually expand into specialty marketable products including sand blasting material, filtration, tree nursery, decorative sands, and sands used in the manufacture of glass and fibreglass.

EMPLOYEES 7-9 persons in 1988.

CLAY PRODUCTS¹⁴

L.E. Shaw Limited

21 I/4W

COMPANY L.E. Shaw Limited, Head Office: P.O. Box 2130, Lantz, Nova Scotia B0N 1R0. Plant and Quarry Office: P.O. Box 188, Chipman, New Brunswick E0E 1C0. Telephone: (506) 339-6605. The Manager is George Roberts.

RIGHTS The company owns about 40 ha of land. Quarriable substances are vested in the owner of the land in or on which they lie.

LOCATION The quarry is located about 3 km east of the plant in Chipman, New Brunswick (Figure 22).

HISTORY In 1929, the company opened a plant in the heart of the Minto coal field at Chipman to use waste shales from the coal mines in making brick and tile. Since 1935, raw material for the plant has been obtained from the shale quarry.

PRESENT OWNERSHIP L.E. Shaw Limited.

RESERVES AND GRADE The material is purple-red sandstone, shale, and siltstone from the Hurley Creek Formation.

DEVELOPMENT The company continued to operate a brick plant using local red shale. The plant produces facing brick, drainage tile, partition tile, radial tile, interlocking tile, and flue liners. Quality acid-resistant brick can also be produced.

EMPLOYEES 25 to 40 persons for manufacturing plant and 1-2 for the quarrying operation.

PROCESSED (DIMENSION) STONE¹⁴

Nelson Monuments Ltd.

21 H/12

COMPANY Nelson Monuments Ltd., P.O. Box 1220, Sussex, New Brunswick, E0E 1P0. Telephone: (506) 432-9000. The contact person is Mr. Merrill Nelson.

RIGHTS Stone is a quarriable substance and rights are therefore vested in the owner of the land in or on which it lies.

LOCATION The plant is located in Sussex, New Brunswick (Figure 22), but quarries have been operated in various places: Charlotte County and Hampstead (Figure 22) in New Brunswick, and Vermillion Bay in Ontario.

HISTORY The company was founded in 1909, and in 1959 it was moved from Hopewell Cape to Sussex.

DEVELOPMENT The company continues to produce monuments, markers, curbing stone, and stone for landscaping use. Much of the granite sold in 1988 was imported from Ontario and Overseas.

EMPLOYEES An average of 30 persons.

Smith Cut Stone and Quarries Limited

21 I/2

COMPANY Smith Cut Stone and Quarries Limited, P.O. Box 69, Shediac, New Brunswick E0A 3G0. Telephone: (506) 532-6902. The President is Roy E. LeBlanc.

RIGHTS Stone is a quarriable substance and rights are therefore vested in the owner of the land in or on which it lies.

LOCATION Shediac, New Brunswick (Figure 22).

HISTORY Founded in 1818, this is the oldest stone quarrying company in New Brunswick. The Shediac sandstone quarry has provided building stone for numerous construction projects, including Moncton's Cathedral. For the last 25 years it has mainly provided cut stone for restoration and related building projects.

DEVELOPMENT The company continues to operate a local sandstone quarry and has been involved in various restoration projects.

EMPLOYEES 2 to 15 persons in 1988.

CRUSHED STONE^{14,15}

Major operations producing crushed stone for use as aggregate are centred around the Fredericton and Moncton areas. Both of these areas are deficient in good quality, coarse, surficial, granular aggregate materials.

In the Fredericton area, Diamond Construction Limited maintains a crushing operation at Springhill, on the south side of the Saint John River. The material crushed is a Silurian greywacke. On the north side of the river, Forbes and Sloat Limited crushes Mississippian basalt at a quarry at Douglas, just west of Fredericton.

In the Moncton area, Moncton Crushed Stone, a Division of Modern Construction Ltd., crushes granitic rocks of Precambrian age at a quarry at Stilesville, northwest of the city. Manufactured fine concrete aggregate is also produced by the operation, by blending crusher-produced fine aggregate with washed natural sand trucked in from the Rogersville area. H.E. Carson Limited also operates a quarry in metasedimentary rocks in the Stilesville area. To the east of Moncton, at Gaytons, Precambrian granitic rocks are crushed by Acadia Crushed Stone Division of Modern Construction Ltd., and by MacDonald's Paving and Construction Limited. C.M. Stewart Company Limited operates a quarry in basaltic rocks in the Campbellton area.

Brookville Manufacturing Company Limited near Saint John and Havelock Lime at Havelock produce crushed dolomite and limestone, respectively, for use as aggregate, in addition to their other lime products. Elmtree Resources Limited of Bathurst also produced crushed limestone for use as aggregate.

Preliminary estimates of stone production for 1988 are 2 960 000 t with a value of \$16 280 000 (Table 3). In comparison, 1987 production was 2 878 000 t valued at \$15 934 000.

SAND AND GRAVEL^{14,15}

Most sand and gravel pits in New Brunswick are operated on an intermittent, on-demand basis; many of these can produce only low-specification aggregate. The comparatively few permanent operations are found where large deposits of good quality material lie within economical trucking distance of high-demand, urban areas (e.g., the Saint John area).

Preliminary estimates of sand and gravel production in New Brunswick during 1988 are 10 300 000 t. Energy, Mines and Resources Canada did not report a total dollar value for the year (Table 3). However, based on previous years, it is estimated to be between \$14 000 000 and \$16 000 000. In comparison, production in 1987 was 11 056 000 t with an estimated value of \$16 585 000.

ENERGY RESOURCES

OIL AND NATURAL GAS²³

Irving Oil Limited

21 H/15

COMPANY Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1. The President is A.L. Irving.

RIGHTS ONG 1se/on-sh 74-1 (2153.7 ha) under the Oil and Natural Gas Act, Chapter O-2.1, R.S.N.B. 1976.

LOCATION The Stoney Creek field (Lease 74-1) is located 16 km south of Moncton (Figure 22).

HISTORY Lease 74-1 was granted a renewal for a 10-year period on March 15, 1984.

PRODUCTION Presently, Irving operates the oil wells while Moncton Utility Gas Company operates all gas wells. Production for 1986 to 1988 follows:

Year	Gas (m ³)	Oil (m ³)
1986	1 822 866	638.9
1987	1 744 683	494.8
1988	1 079 540	367.1

COAL²⁴

N.B. Coal Limited

21 I/4, 21 J/1

LOCATION The Minto-Chipman coalfield is approximately 60 km east-northeast of Fredericton (Figure 22).

RIGHTS Mining Licence 1307 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

HISTORY The first recorded coal mining in North America occurred near Grand Lake in 1639. The coal was exported to Massachusetts. Production was limited to a few thousand tonnes annually until the 1900s. Expansion of the coal mining industry was coincident with development of the railways. The railways not only provided transportation to markets in New Brunswick, Quebec, and the state of Maine, but were also large users of coal. Construction of the Grand Lake Generating Station in the early 1930s provided another market for coal.

In 1941 disposition of coal was: electric power generation, 10%; railways, 40%; and industrial (mainly pulp and paper mills), 50%. This was also the first year that strip mining accounted for 20% of the production. Since 1971 all production has been from stripping operations.

Low oil prices in the 1960s led to the decision to form a Crown Corporation that would phase out uneconomic operations while continuing to produce enough coal for the Grand Lake Generating Station. The 1973 Arab oil embargo and the rapid escalation in oil prices caused a change in the attitude toward burning coal. This ultimately led to the decision by NB Power to add a 200 Mw unit, which could be fuelled by oil or coal, to the Dalhousie Generating Station. In order to supply the necessary coal for Dalhousie, N.B. Coal Ltd. purchased and erected on site a Marion 8200 dragline. This dragline, which first produced in 1979, accounts for 60% of the annual production.

Prior to 1978 mining companies did not have to be concerned about reclamation. This resulted in large areas of land that were not levelled but which did revegetate naturally. Other areas have been levelled and reforested. The present plan is to level areas and allow them to revegetate naturally. Abandoned highwalls are sloped to 45°.

COMPANY N.B. Coal Ltd., P.O. Box 520, Minto, N.B., EOE 1JO,
President: Mr. A. Cormier, **Parent Company:** NB Power.

RESERVES 9 600 000 t of coal, proven.

PRODUCTION 529 500 t of coal (1988); 550 000 t of coal (1987)

DEVELOPMENTS N.B. Coal Ltd. moved the 500 dragline from the Fire Road-Bog Camp mine to the Little River mine 5 km south of Minto. The 500 dragline was moved because of the generation of low pH water at the Fire Road-Bog Camp mine site. Discharge waters from this site continue to be treated with lime in order to control acidity. The company has expanded efforts to level spoilpiles created since 1978. Their plans are to be caught up with reclamation within 3 years and to have levelling coincide with mining.

EMPLOYEES 1988 230-250.

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XYZ

ABBREVIATIONS

cm - centimetre	mgal - milligal
m - metre	Hz - Hertz
km - kilometre	M - mega (prefix for 1 000 000)
g - gram	t/a - tonnes per year
t - tonne	t/d - tonnes per day
L - litre	
ha - hectare	

CONVERSIONS

Square miles (sq. mi.) $\times$ 2.589 988 = square kilometres (km²)

Short tons $\times$ 0.907 184 = tonnes (t)

Acres (ac.) $\times$ 0.404 685 = hectares (ha)

For precious metals:

ounces per ton (oz./ton) $\times$ 34.285 71 = grams per tonne (g/t)

For oil (1 barrel = 42 U.S. gallons):

barrels $\times$ 0.158 987 3 = cubic metres (m³)

For natural gas:

cubic feet (cu. ft.) $\times$ 0.028 316 85 = cubic metres (m³)

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